

## Egg size variation and breeding characteristics of the Black-winged Stilt *Himantopus himantopus* in a Saharan oasis

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**Abstract.** Different aspects of the breeding biology of the Black-winged Stilt were studied in a natural oasis wetland area in the Sahara Desert, the Chott of Ain El Beida, near Ouargla, E Algeria in 2004–2007. In this wetland the water level is independent of rainfall and Stilts start egg laying when average daily temperature increases to ca. 15°C, mostly in April–May, with no significant differences between years. Complete clutches usually consist of 4 eggs but 3 egg clutches happen with low frequency (2.9–5.6%). Egg size traits (mass, length, breadth and volume) tended to decrease from 2004 to 2007, probably due to deteriorating hydrological conditions of the wetland. Within-clutch variability showed both significant repeatability and laying-sequence-dependent differences among eggs, with the final egg being smaller than the clutch mean value. We found that all egg traits studied showed a negative correlation with the date of laying, which seems to be a phenomenon analogous to the seasonal decrease in clutch size, typical of birds with more variable clutch sizes. Hatching tended to be asynchronous, with average clutch hatching time being 1.84 days. The small final egg and hatching asynchrony are typical components of the adaptive brood reduction, the phenomenon not being recorded so far and remaining for future studies on the Black-winged Stilt. These are the first published data on breeding characteristics for any N African population of the Black-winged stilt.

**Key words:** Black-winged Stilt, *Himantopus himantopus*, oasis wetland, Sahara, breeding biology, clutch size, egg size, laying order, hatching asynchrony

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## Song repertoires in a western European population of Yellowhammers *Emberiza citrinella*

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Caro S. P., Keulen Ch., Poncin P. 2009. Song repertoires in a western European population of Yellowhammers *Emberiza citrinella*. *Acta Ornithol.* 44: 9–16. DOI 10.3161/000164509X464830

**Abstract.** Geographic variation is one of the most intensively studied bird song topics. However, our knowledge of geographical song variations in most species studied so far is very sparse, with many areas of the species-typical geographic distributions still unexplored. One striking example is the Yellowhammer: for this species most song studies have been conducted along well defined dialect borders, but almost nothing is known about its song characteristics in other regions of its broad geographic distribution. In this study, we investigated the song structure variations and stereotypes in different areas of western Belgium and northern France. We described 66 different song types (a-elements) in 45 males recorded. Each male had a unique individual repertoire consisting of 1 to 4 of these song types. This high variability at the individual level contrasted with the high homogeneity of the specific repertoire over the whole geographic distribution of the species. The evolutionary implications of such specificity are discussed with regard to song learning and timing of singing activity. Finally, all males recorded belonged to the western regiolect, although some mixed-singers were also recorded. These results contrast with the very few studies previously conducted in western Europe which have suggested that eastern regiolect songs were common in this geographic area.

**Key words:** *Emberiza citrinella*, Yellowhammer, song characteristics, recognition, dialect

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## Space use of adult Spanish Imperial Eagles *Aquila adalberti*

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Fernández M., Oria J., Sánchez R., González L. M., Margalida A. 2009. Space use of adult Spanish Imperial Eagles *Aquila adalberti*. *Acta Ornithol.* 44: 17–26. DOI 10.3161/000164509X464849

**Abstract.** The ranges and space use of eight radio-tracked Spanish Imperial Eagles are described. The annual mean range was 25 146 ha during the breeding season (BS) and 20 557 ha in the non-breeding season (NBS). The eagles were found up to 35.9 km away from their nest during BS and nearly 62 km away during NBS. The maximum total distance covered in one day was 113.6 km, with males flying longer distances than females during BS. There was less overlap between ranges during BS, and the mean home range varied from 3881 ha in BS to 2085 ha in NBS. The areas where territorial behaviour (display flights, defence and/or aggression) was observed contained the nest-tree, the most frequently used perches, and the feeding ground nearest to the nest. Breeding home ranges were negatively correlated with densities of Rabbits *Oryctolagus cuniculus*. Breeding eagles whose home range had low rabbit densities travelled 16.2–28.9 km from their nest to reach distant, undefended feeding grounds with much higher rabbit densities. Our results suggest that home ranges varied with prey density and a bird's reproductive status. Larger breeding ranges are probably related to an increase in energy requirements, while habitat quality is probably a regulatory mechanism of space use. In terms of home range analysis methodology, our observations of eagle behaviour favour Cluster Analysis over Kernel, particularly for defining distant feeding grounds.

**Key words:** Spanish Imperial Eagle, *Aquila adalberti*, home range, spatial use, territorial behaviour

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## Variation in the relationship between lay date and clutch size in three cavity-nesting woodland passerines

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Goodenough A. E., Elliot S. L., Maitland D. P., Hart A. G. 2009. Variation in the relationship between lay date and clutch size in three cavity-nesting woodland passerines. *Acta Ornithol.* 44: 27–36. DOI 10.3161/000164509X464858

**Abstract.** Clutch sizes of many single-brooded birds decrease as the breeding season progresses. This decrease is usually quantified using data from several years, an approach that would mask any annual variation. We used 15 years of data from 295 nestboxes occupied by Blue Tit, Great Tit and Pied Flycatcher to determine whether the strength of the relationship between lay date and clutch size is consistent, or whether it varies annually. Both lay date and year were strong predictors of clutch size for all species. However, Generalised Linear Modelling revealed an interaction between lay date and year in the prediction of clutch size, indicating that the strength of the relationship between lay date and clutch size varied between years. Multilevel modelling was used to establish proximate factors that may be responsible for annual variability. Factors affecting the relationship between lay date and clutch size were species-specific. For Blue Tits, seasonal decline in clutch size was steepest when the density of all cavity-nesting species was high (47% variance explained). For Great Tits, decline was steepest in “early” seasons, particularly when density was high (32% variance explained), and for Pied Flycatchers, decline was steepest in warmer years (33% variance explained). Thus annually variable factors appear to influence not only breeding phenology and clutch size individually, but also the relationship between these variables.

**Key words:** annual variability, relative date hypothesis, lay date, clutch size, multilevel modelling, *Parus major*, *Cyanistes caeruleus*, *Ficedula hypoleuca*

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## Potential impact of EU accession on common farmland bird populations in Hungary

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Nagy S., Nagy K., Szép T. 2009. Potential impact of EU accession on common farmland bird populations in Hungary. *Acta Ornithol.* 44: 37–44. DOI 10.3161/000164509X464867

**Abstract.** The accession of Hungary to the European Union is likely to result in the intensification of arable crop cultivation. As a result of market forces and rural development measures, small parcels of land will be consolidated into larger fields. It is also likely that the area of maize and oilseed rape, and to a lesser extent that of sunflower, will increase at the expense of cereals. Abandoned land, ineligible for area payments will probably not return to cultivation. To identify the potential impact of these changes on the populations of common farmland birds, we analysed the data from 680 homogeneous sample plots of the Hungarian Common Bird Monitoring Scheme (MMM) from 2003. We used pair-wise comparisons with the Mann-Whitney test to identify the difference in the index of abundance of 34 species amongst the following categories of crops: abandoned versus cultivated arable land, small parcels versus large fields, cereals versus maize, sunflower and oilseed rape, fallow land versus small or large fields. Our results suggest that land consolidation will have the most serious negative impact on common farmland bird populations because small-scale farming systems hold significantly larger numbers of seven common farmland bird species, – White Stork *Ciconia ciconia*, Lapwing *Vanellus vanellus*, Wood Pigeon *Columba palumbus*, Whinchat *Saxicola rubetra*, Stonechat *Saxicola torquatus*, Tree Sparrow *Passer montanus*, Greenfinch *Carduelis chloris*, – than large-scale farms. On the other hand, the compulsory setaside might present some opportunities for the compensation of these negative effects if biodiversity considerations are integrated into the national rules, because fallow land held significantly higher densities of nine species, — Linnet *Carduelis cannabina*, White Stork, Yellowhammer *Emberiza citrinella*, Grasshopper Warbler *Locustella naevia*, Woodlark *Lullula arborea*, Whinchat, Stonechat, Whitethroat *Sylvia communis* and Blackbird *Turdus merula*, — than large crop fields. Comparison of large-scale cereal fields with large-scale maize, sunflower or oilseed rape fields, respectively, revealed significant differences only in the case of a few species, for example, the greater abundance of Skylarks *Alauda arvensis* in cereal than in maize, of Lapwings in sunflower and of Whinchat in oilseed rape than in cereal fields.

**Key words:** EU accession, farmland birds, monitoring, Hungary

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## Are changes in predatory species composition and breeding performance responsible for the decline of Coots *Fulica atra* in Milicz Ponds Reserve (SW Poland)?

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Ręk P. 2009. Are changes in predatory species composition and breeding performance responsible for the decline of Coots *Fulica atra* in Milicz Ponds Reserve (SW Poland)? *Acta Ornithol.* 44: 45–52. DOI 10.3161/000164509X464876

**Abstract.** Both native and non-native predators should strongly affect resident fauna. Nevertheless, because of a lack of defensive mechanisms in potential prey, the influence of non-native predators should have longer-lasting and more deleterious repercussions. The breeding ecology of the Coot was studied in the Milicz Ponds reserve and compared with data from 20 years earlier. In the meantime, non-native, mammalian predators (American Mink *Mustela vison*, Raccoon Dog *Nyctereutes procyonoides* and Raccoon *Procyon lotor*) turned up in this area, while the numbers of Hooded Crow *Corvus cornix*, the main predator of Coot nests, decreased. Compared with 1980–1982, the number of Coots in 2002–2003 dropped by more than half and mean clutch size decreased. Breeding success and the number of hatchlings per pair remained unchanged; in the 1980s, however, Coots renested more frequently, there was greater nesting synchrony and breeding seasons were demonstrably shorter. Moreover, although predation still remained the main cause of losses, its numbers were decreasing. Coots nesting on islands were the most successful, which was due to the weaker predation on the part of Crows. In contrast, the mammalian (non-native) predators did not appear to play a significant role in the breeding success in 2002–2003. Nevertheless, taking into account the breeding parameters of the Coot population and the nature of the relationship between mammalian/bird predators and Coots, it does seem that the low density of Coots in 2002–2003 was a reaction to the pressure of mammalian predators.

**Key words:** Coot, *Fulica atra*, nest predation, breeding success, population trends, Milicz Ponds

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## Temporal and spatial differences in the feeding ecology of the Spanish Imperial Eagle *Aquila adalberti* during the non-breeding season: effects of the rabbit population crash

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Sánchez R., Margalida A., González L. M., Oria J. 2009. Temporal and spatial differences in the feeding ecology of the Spanish Imperial Eagle *Aquila adalberti* during the non-breeding season: effects of the rabbit population crash. *Acta Ornithol.* 44: 53–58. DOI 10.3161/000164509X464885

**Abstract.** The paper describes the diet of territorial Spanish Imperial Eagles during the non-breeding season, comparing prey identified across different regions (Central, Western and Southern), breeding season vs non-breeding season, and periods (1983–1985 or pre-viral haemorrhagic disease [RHD] vs 1991–2000 or post-RHD). Comparison of the non-breeding with the breeding season revealed a slight variation in the diet. The Rabbit *Oryctolagus cuniculus* continues to be the most important prey species in the eagle's diet during the non-breeding season, followed by pigeons and the Red Partridge *Alectoris rufa*, although this varies from one region to another. In general, the decrease in the rabbit population after the epizooty (RHD) does not appear to have had an impact on the occurrence of this prey species in the Spanish Imperial Eagle's diet. Although this species is generally considered to be specialised in the capture of rabbits, the variability found between regions suggests that when the main prey (wild Rabbit) is scarce, the Spanish Imperial Eagle's diet is based on alternative prey such as pigeons or carrion.

**Key words:** Spanish Imperial Eagle, *Aquila adalberti*, feeding ecology, non-breeding season, rabbit viral haemorrhagic disease, alternative prey

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## Plasma testosterone profile of male Tawny Owls *Strix aluco* in relation to breeding density, breeding experience, and offspring provision

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Sasvári L., Péczely P., Hegyi Z. 2009. Plasma testosterone profile of male Tawny Owls *Strix aluco* in relation to breeding density, breeding experience, and offspring provision. *Acta Ornithol.* 44: 59–68. DOI 10.3161/000164509X464894

**Abstract.** The role of plasma testosterone in territorial behavior and breeding success, which has not previously been examined in nocturnal raptors, was studied in male Tawny Owls. Blood was collected for testosterone analysis during the territorial and nestling periods from owls breeding in nest boxes in Duna-Ipoly National Park, Hungary. Testosterone levels, defense activity, prey supply for broods and reproductive performance were related to breeding density and breeding experience of males. Defense activity, as measured by responses to broadcasted hooting calls and dummy owls during the territorial period, correlated positively with testosterone concentration. Males with more breeding experience had high testosterone levels and occupied better territories in dense breeding areas than less experienced males which had low testosterone concentrations. Mate fidelity was linked male quality: females were more likely to be tenacious in good territories. Testosterone levels dropped between territorial and feeding periods, however males with higher concentrations fed nestlings more frequently with high mass prey per night because food was more abundant in territories they had secured. We suggest that differences in testosterone levels in the provisioning period are related to the males' abilities to acquire territories of different quality.

**Key words:** breeding related to altitude, divorce rate, parental care, responses to acoustic stimuli, *Strix aluco*, Tawny Owl, territory defense, territory quality, testosterone

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## Changes in breeding phenology and performance of Wood Warblers *Phylloscopus sibilatrix* in a primeval forest: a thirty-year perspective

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Wesołowski T., Maziarz M. 2009. Changes in breeding phenology and performance of Wood Warblers *Phylloscopus sibilatrix* in a primeval forest: a thirty-year perspective. *Acta Ornithol.* 44: 69–80. DOI 10.3161/000164509X464902

**Abstract.** The reproductive behaviour of Wood Warblers was studied in a primeval forest area in the Białowieża National Park (E Poland). Observations carried out during twelve seasons (1976–1979, 1985–1988, 2002–2005) in deciduous and coniferous old-growth habitats spanned a 30-year period. The present paper examines whether the birds advanced their breeding dates during that time and whether any long-term shifts in fecundity or productivity were detectable. Though temperatures in the settlement period (the second half of April) rose, neither males nor females significantly advanced their dates of arrival. Wood Warblers bred earlier in 2002–2005 than in the two previous periods — the combined effect of earlier female arrival and shortening of post settlement breaks. Clutch size declined with season, was smaller in the coniferous habitat and in rodent outbreak years, but no long-term trend was perceptible. Apart from two exceptionally successful years (2003 and 2004) breeding losses remained high during the whole study. Predation was responsible for 80–95% of them and was concentrated on the nestling stage. Overall Wood Warbler phenology and breeding performance in BNP have changed relatively little during the last 30 years. These findings support the results of other studies demonstrating the remarkable resilience of this primeval forest biota to environmental change.

**Key words:** Białowieża National Park, timing of breeding, climate change, clutch size, nest loss, nestlings' ageing

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## Parental investment of female Tengmalm's Owls *Aegolius funereus*: correlation with varying food abundance and reproductive success

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Zárybnická M. 2009. Parental investment of female Tengmalm's Owls *Aegolius funereus*: correlation with varying food abundance and reproductive success. *Acta Ornithol.* 44: 81–88. DOI 10.3161/000164509X464911

**Abstract.** The effects of food abundance, reproductive success and age of nestlings on parental care in female Tengmalm's Owls were tested in this study. The behaviour of female owls was monitored by a camera system from hatching to fledging at 12 nests in 2004 and 2006 in the Ore Mountains, Czech Republic. Food abundance and reproductive success (the latter measured at the end of female's attendance of the brood) were higher in 2004 than in 2006. Females remained for a significantly longer time with their nestlings at the nests in 2004 ( $24.8 \pm 2.4$  days) than in 2006 ( $22.2 \pm 0.9$  days). During the attendance period, they were leaving the nest for several short trips each night; the duration of these trips, the total time spent outside the nest per night, and the number of trips per night did not differ between years. However, these variables did increase with increasing age of the young (though the number of trips per night increased only during the last week of the females' stay on the nests). Two types of female parental strategies were recorded after the end of brood attendance period: in 2004 when food was abundant, most of the females left their broods, whereas in 2006 when food was scarce, most of the females continued parental care and took part in the feeding of nestlings. The reproductive success was correlated negatively with both the total number of prey items and the proportional contribution of the females to nestling feeding. These results support the hypothesis that if the ecological conditions are such that the offspring can be raised by a single parent, its mate may abandon the clutch or brood and increase its fitness by sequential polygamy (polyandry/polygyny) during a single breeding season.

**Key words:** Tengmalm's Owl, *Aegolius funereus*, female parental care, brood desertion, food abundance, reproductive success

## Trends in the arrival dates of spring migrants in Lublin (E Poland)

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Biaduń W., Kitowski I., Filipiuk E. 2009. Trends in the arrival dates of spring migrants in Lublin (E Poland) *Acta Ornithol.* 44: 89–94. DOI 10.3161/000164509X464920

**Abstract.** Long-term trends in the first arrival dates of 15 common breeding bird species to the city of Lublin (eastern Poland) were studied for the period 1982–2006. Only two species tested, Whitethroat *Sylvia communis* and Blackcap *Sylvia atricapilla*, demonstrated a statistically significant trend toward earlier arrival. No significant correlation between the first arrival date and spring (March to May) temperature was found for any of the species studied although some correlations were significant with temperatures of individual months. A significant correlation with winter temperature was found for only 2 species, Lesser Whitethroat *Sylvia curruca* and Blackcap. Short distance migrants arrived significantly earlier (median date: April 13) than the long distance migrants examined (median: May 7). The mean first arrival date of short distance migrants was more temperature related than that of long distance migrants. The results support the hypothesis that climate related changes in the first arrival dates of birds are manifested less in birds in the interior of the European continent than on its periphery.

**Key words:** phenology, climate changes, migration, first arrival dates, temperature, Lublin, Poland

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## Repeatable length and mass but not growth rate of individual feathers between moults in a passerine bird

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De La Hera I., Pérez-Tris J., Tellería J. L. 2009. Repeatable length and mass but not growth rate of individual feathers between moults in a passerine bird. *Acta Ornithol.* 44: 95–99. DOI 10.3161/000164509X464939

**Abstract.** Plumage is regularly replaced over the lifetime of birds, and, consequently, variable conditions experienced during plumage development can affect feather growth rate or the expression of feather characteristics. We assessed intra-individual constancy in the length, mass, and growth rate of tail feathers between complete moults of 13 free-living individual Blackcaps *Sylvia atricapilla*. Between-moult repeatability was high for the length and mass, but not for growth rate of individual tail feathers. The feathers produced in the later moult grew at a slower rate, which shows that the time to produce similar feathers increases with age.

**Key words:** developmental plasticity, feather traits, ptilochronology, Blackcap, *Sylvia atricapilla*, within-individual repeatability

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