Journal of Avian Biology

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Chambon, R., Dugravot, S., Paillisson, J.-M., Lemesle, J.-C., Ysnel, F. and Gélinaud, G. 2018. Partial migration in inexperienced pied avocets *Recurvirostra avosetta*: distribution pattern and correlates. – J. Avian Biol. doi: 10.1111/jav.01549

Supplementary material

Appendix 1. Re-sighting locations and wintering regions

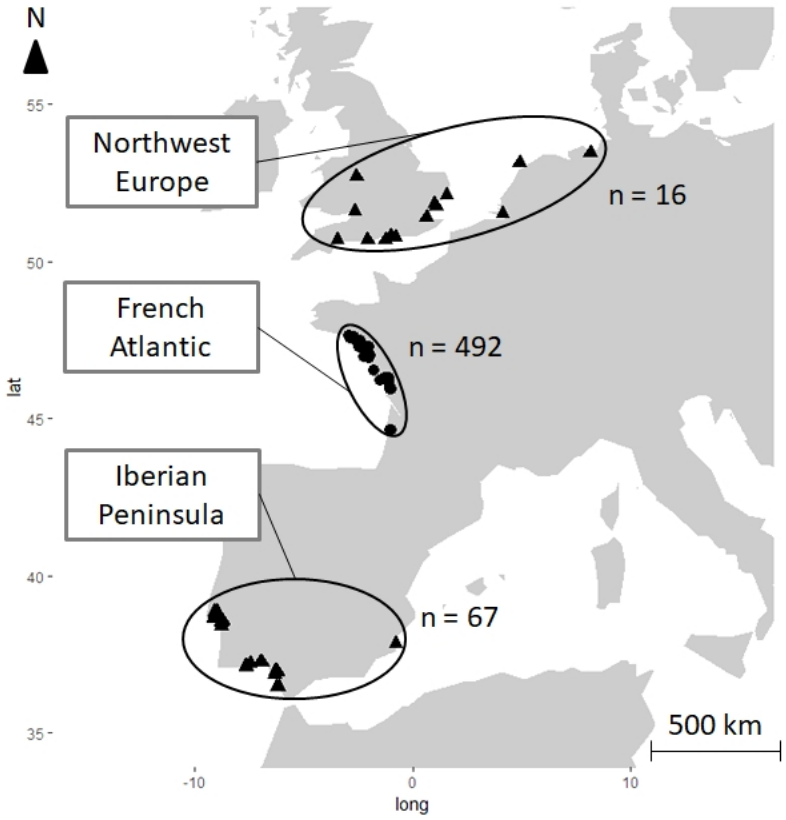

Figure A1. Distribution of all re-sightings (one location per first-year Pied avocet, n = 575) taken into account in the study. This resulted in three separate wintering regions: “French Atlantic” for resident birds (n = 492 individuals), and both “Northwest Europe” and “Iberian Peninsula” for migrant ones (n = 16 and n = 67, respectively).

Appendix 2. Hatching date estimation and categorization

Based on the growth curves (bill, tibia and wing) of Pied avocet chicks provided in the supplementary material of Adret (2012), we modelled the growth of bill length (from the tip of the upper mandible to the base of the first feathers of the skull, in mm) as a function of age (in days) using a logistic equation (Fig. A2). We selected bill measurements instead of tibia (tibiotarsus) or wing lengths because the tibia was not measured when ringing the chicks, and bill length usually shows a very constant growth rate during pre-fledging in Charadriiformes birds (Beintema and Visser 1989). Bill length was also assumed to be more independent of environmental conditions than wing growth during this period. Equation parameters were then validated by comparing estimated and known ages of wild French chicks (n = 34, mean ± SD of known ages = 26 ± 4.6 days, ranging from 15 to 35 days). For this, estimated ages were calculated from the reversed logistic equation we had built using measurements of bill length. Differences in age (mean ± SE) between known and estimated values were 2.2 ± 0.24 days (ranging from 0 to 5 days). Consequently, the logistic growth equation was suitable to estimate chick ages using measurements of bill length during the pre-fledging period.

In the second stage, we categorized hatching dates (back-calculated using estimated ages and capture dates) into three classes from the distribution frequency of all pooled data available (n = 557, Fig. A3). It consisted of defining the intercepts (dotted lines) of three Normal distributions (curves) obtained using the "mixtools" library in R software (Fig. A3): (i) early (n = 189, hatched before the 30rd of May), (ii) median (n = 249, hatched between the 31st of May and the 28th of June) and (iii) late-hatched chicks (n = 119, hatched after the 28th of June). These subdivisions were coherent with field observations concerning hatching

peaks within the breeding region studied. The accuracy of the estimated hatching dates and hatching group assignment (i.e. early, median or late) was then considered as appropriate, notably with respect to the duration of the breeding season (about four months: from April to early August).

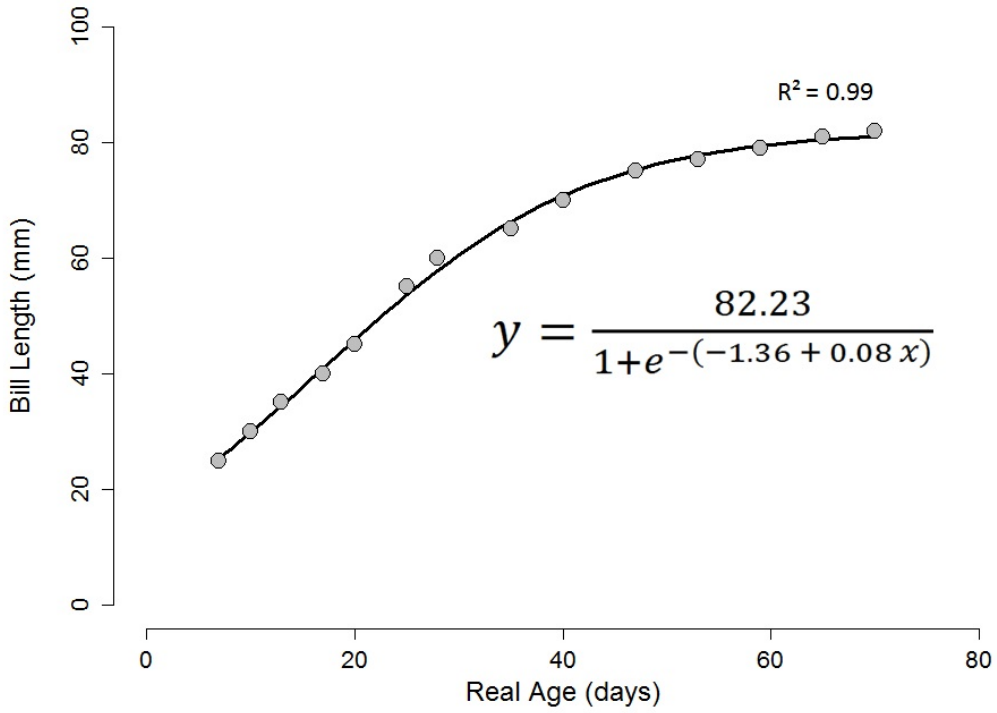

Figure A2. Logistic equation modelling the growth of bill length (y, in mm) as a function of the age (x, in days) in Pied avocet chicks from material provided in Adret (2012).

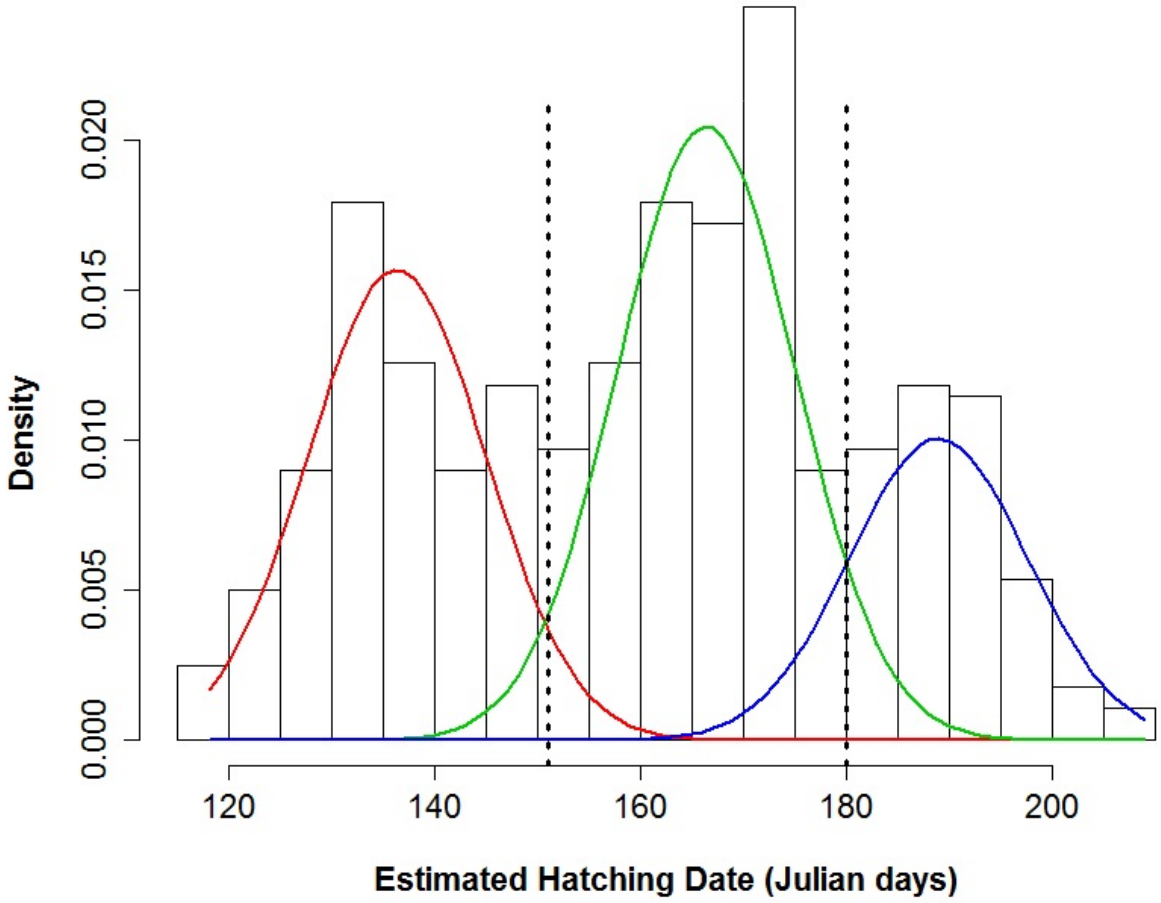

Figure A3. Distribution of estimated hatching dates (in Julian days) of the Pied avocet chicks studied (n = 557) with a three-level division (dotted lines) based on fitted Normal curves.

References

Adret, P. 2012. Call development in captive-reared Pied Avocets, *Recurvirostra avosetta*. – J. Ornithol. 153: 535–546.

Beintema, A. J. and Visser, G. H. 1989. Growth parameters in chicks of charadriform birds. – Ardea, 77: 169–180.