

Appendix B of “Reproductive consequences of the timing of seasonal movements in a non-migratory wild bird population”

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Simulation study.— The main innovation of this model, and the central biological question addressed by it, compared to the existing stopover-type models is the dependence of breeding-related parameters on the unknown arrival times. Hence, in this section we demonstrate, using simulations, the ability of the model to provide unbiased estimates for these parameters when they depend on the unknown time of arrival at the site, for varying values of the capture and resight probabilities during the NBS and BS.

Specifically, we set $K = 10$, $\beta = (0.10, 0.04, 0.18, 0.12, 0.01, 0.20, 0.30, 0.04, 0.01, 0.00)$, $N_M = 1000$, $N_U = 800$ and $\phi = 0.8$ while ψ , ξ and η are logistically regressed on b , which is standardised, with a common intercept equal to -1 and slopes equal to -4, -2 and -3, respectively. The values for the β parameters were chosen to have this pattern, with individuals arriving in bursts rather than a constant rate, to resemble the reality at

breeding sites. We ran two simulation sets, one with capture and resight probabilities during the NBS and the BS set as high ($p = 0.5, s = 0.7, p^B=0.6, s^B=0.8$) and one when they are set as low ($p = 0.2, s = 0.3, p^B=0.3, s^B=0.4$). We assume that $p' = p$ and $s' = s$.

The model that was used to simulate data was fitted and the resulting estimates for the transition probabilities, shown in Fig. 1, demonstrate that the model is able to identify and correctly estimate the dependence of these probabilities on the unknown time of arrival at the site. When capture and resight probabilities are low there is more variation in the estimates, as expected. This is especially true for the η parameters of the late arrivals, which is likely due to the smaller number of individuals that belong to this subgroup.

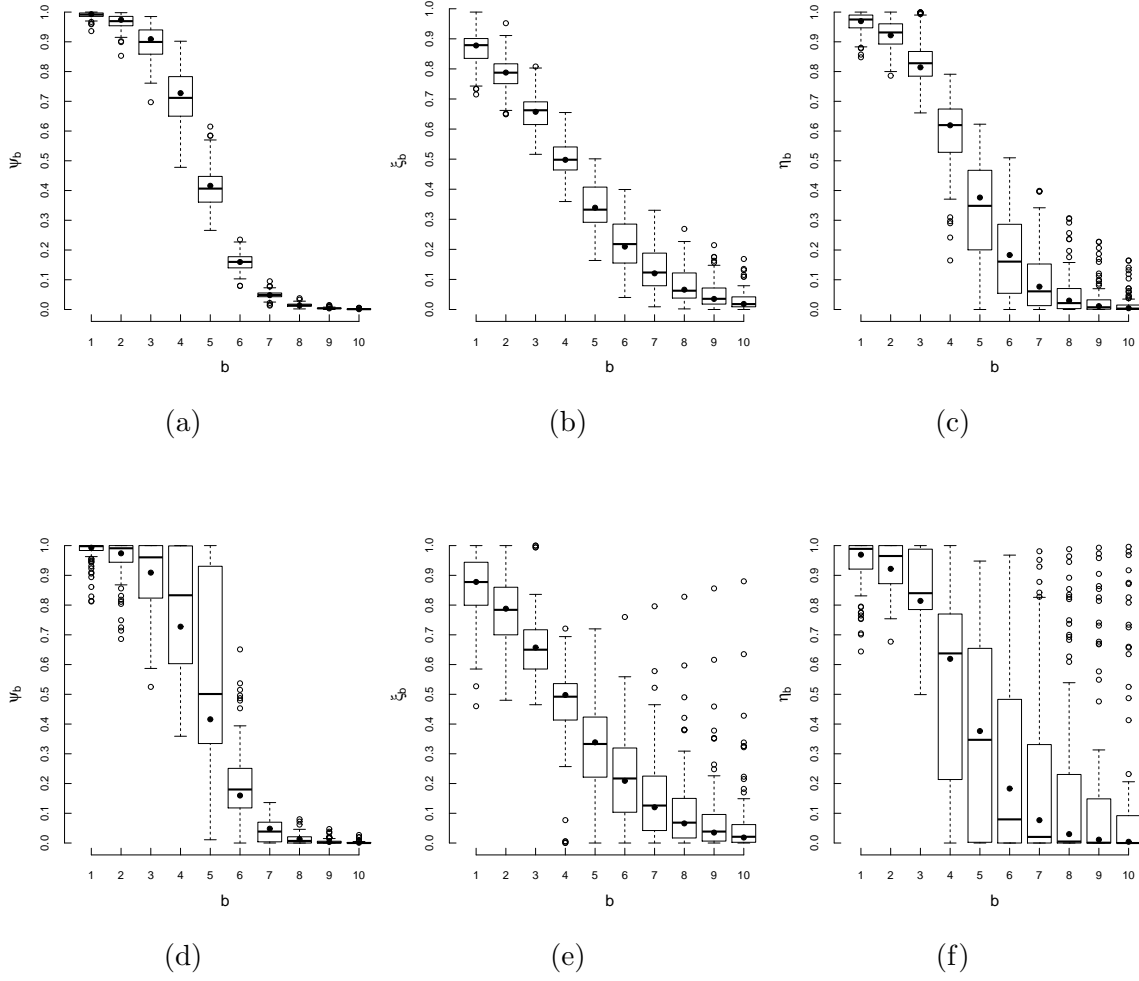


FIG. B1: Simulation results: true values (black dots) and box-plots of estimates obtained from 100 simulations for the transition probabilities between the states in the breeding season when capture and resighting probabilities are set as high (top row) and low (bottom row).