Appendix 4. Early stopping

Occupancy models

All occupancy models converged ~~(or nearly so in the case of Common Eider)~~ **BH: delete this** to the maximum likelihood estimates (i.e., did not stop early; Figure 4.1). Failure to stop early sometimes happens in data sets with many observations and strong effects (see comment of Kneib in Bühlmann et al. 2014). This suggests that the effects of the environmental variables on sea duck occupancy are rather complex.

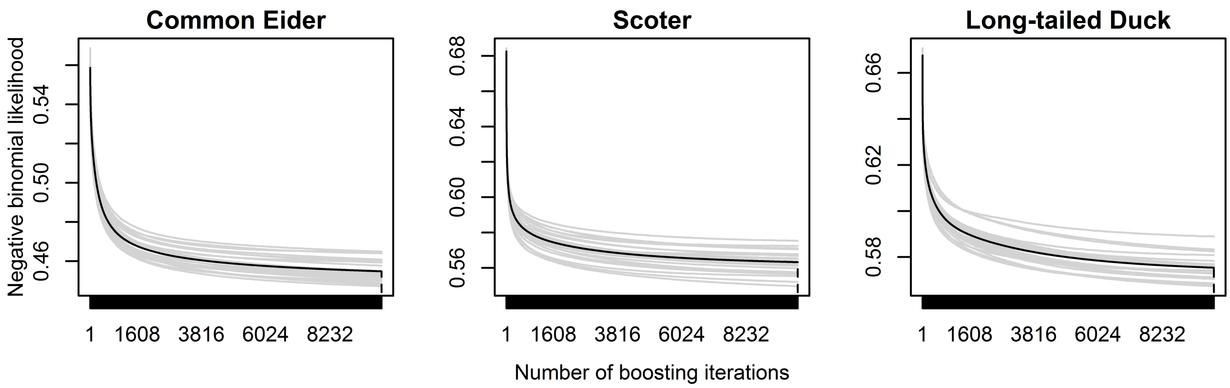

Figure 4.1 Bootstrapped out-of-bag empirical risk in sea duck occupancy models based on 25-fold subsampling. Gray lines indicate the out-of-bag risk on each subsample and the black line indicates the average out-of-bag risk; the optimal iteration is indicated by the dashed vertical line.

Count models

In contrast to occupancy model, bootstrapping prescribed early stopping for both parameters in all count models (Figure 4.2). **Elaborate on *why we need more iterations for the scoter model is simply a result from the fact that the scoter model is more complex or at least takes longer to "converge"* BH: I wouldn't give too much about these numbers. It simply says that we need more iterations until reaching the optimum. Yes, it can indicate that we need a more complex model, yet, this is not necessarily the case. We should simply look at the final models and interpret these. That is more enlightening.**

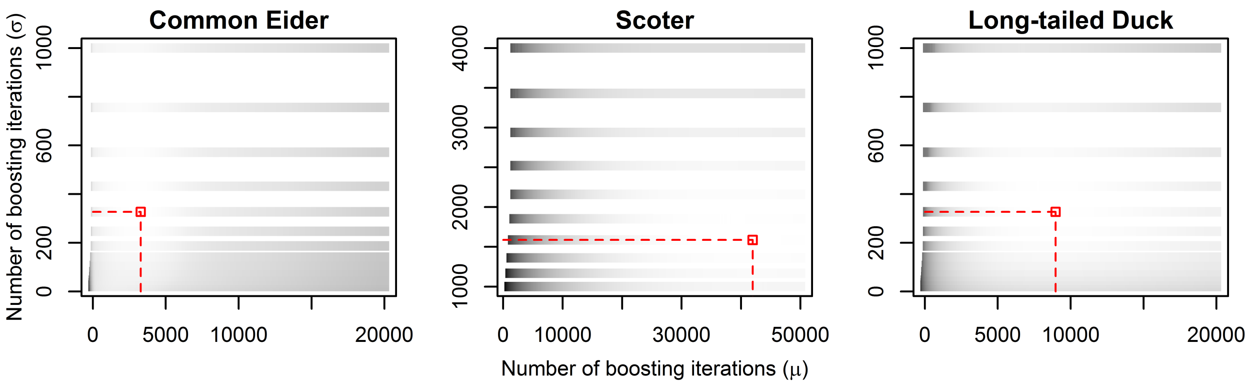

Figure 4.2 Bootstrapped out-of-bag empirical risk in sea duck conditional count models based on 25-fold subsampling. Lighter colors indicate lower average out-of-bag risk (over the 25 samples) for a given combination of m_{stop}-values for μ and σ; the optimal combination is indicated by the red square.

Bühlmann, P., J. Gertheiss, S. Hieke, T. Kneib, S. Ma, M. Schumacher, G. Tutz, C. Wang, Z. Wang, and A. Ziegler. 2014. Discussion of "the evolution of boosting algorithms" and "extending statistical boosting". Methods of Information in Medicine 53:436–445.