Time-varying habitat selection analysis: A model and applications for studying diel, seasonal, and post-release changes

Romain Dejeante; Marion Valeix; Simon Chamaillé-Jammes

Journal: Ecology

Appendix S1: Insights into *Q*, the wiggliness, and its initialization from computer simulations

S1.1. General guidelines to initialize the wiggliness parameter *Q*

First, our results show that the value of *Q* can be increased until the estimated value of Q at the end of the fitting process converge towards a similar value (Appendix S1: Figure S1). Hence, we encourage users of the model to test several values of *Q* until the estimated value has converged.

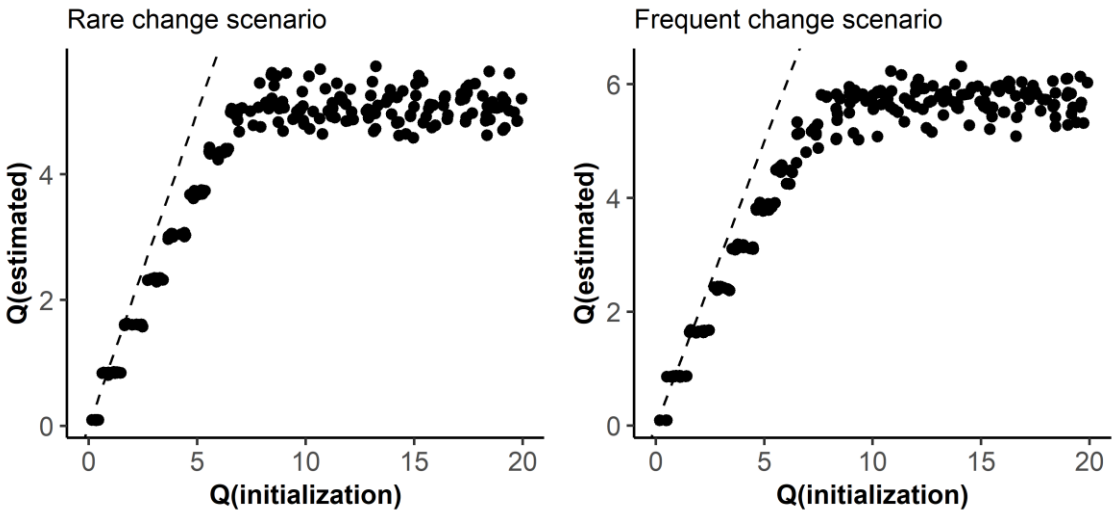

Figure S1. Influence of the initial value used to fill in the covariance matrix *Q* (initialization) on the estimated value of the value of *Q* relevant for the variance of beta (here referred to as Q(estimated)). Each point is the result of one time-varying HSA fitted to one trajectory simulated over 500 time steps.

Second, our results show that the value of Q can be increased until the estimated coefficients of habitat selection converge towards a similar value (Appendix S1: Figure S2). Another way to select among several initial values of Q is therefore to look at the correlations between the time series of the estimated time-varying coefficients.

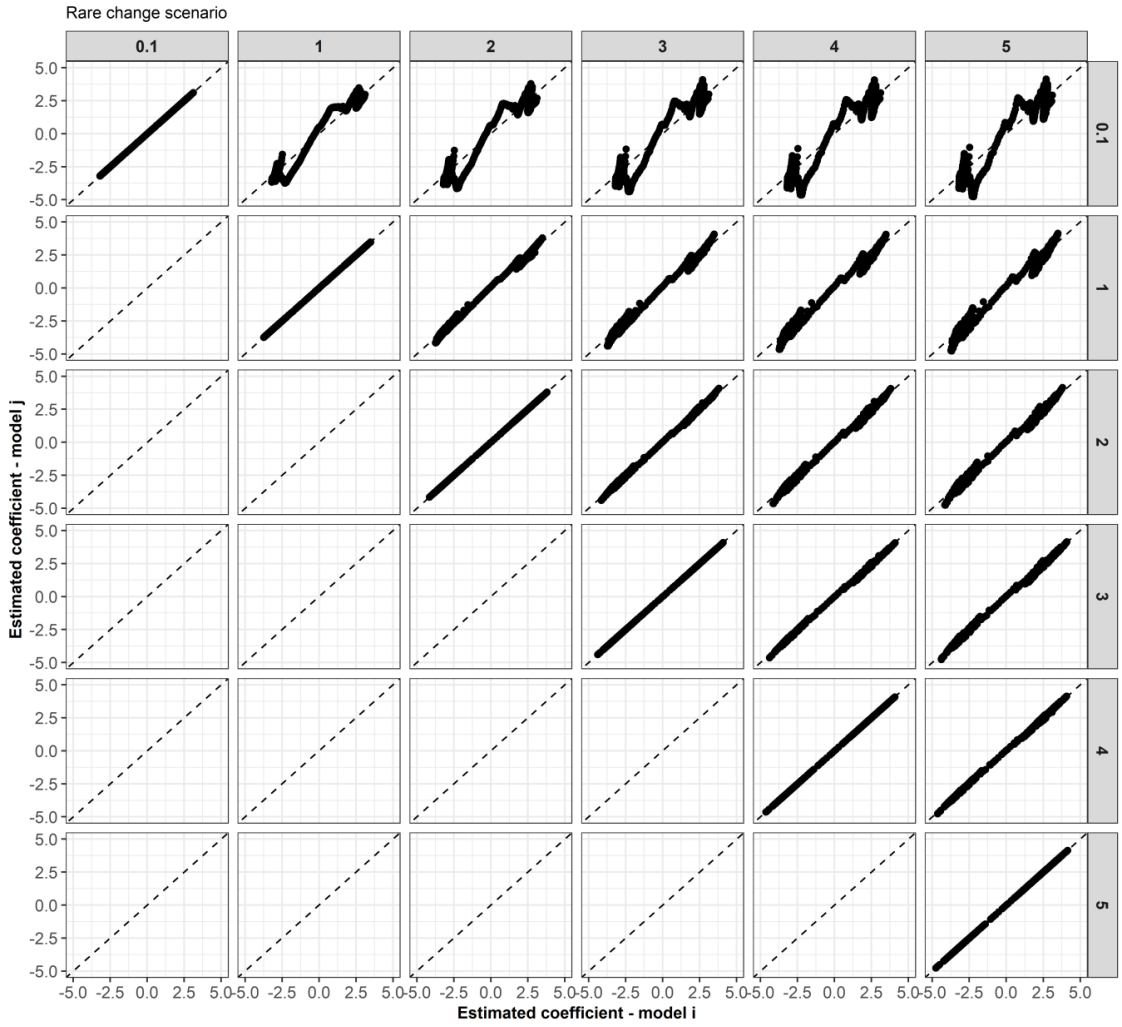

Figure S2. Relationship between the coefficients of habitat selection estimated from models “i" and “j” implemented with different initial values used to fill in the covariance matrix (Q). These initial values are shown in the grey panels (0.1; 1; 2; 3; 4; 5). In this example, one should choose initial values of the covariance matrix larger than 1, since below 1 the estimated coefficients varied greatly from one model to another. When the estimated coefficients are greatly correlated

together, the choice of the initial value to fill in *Q* is 'good enough' as it shows that the models have converged towards the same estimated coefficients.

S1.2. Evaluation of dynamic logistic models initialized with several values of Q

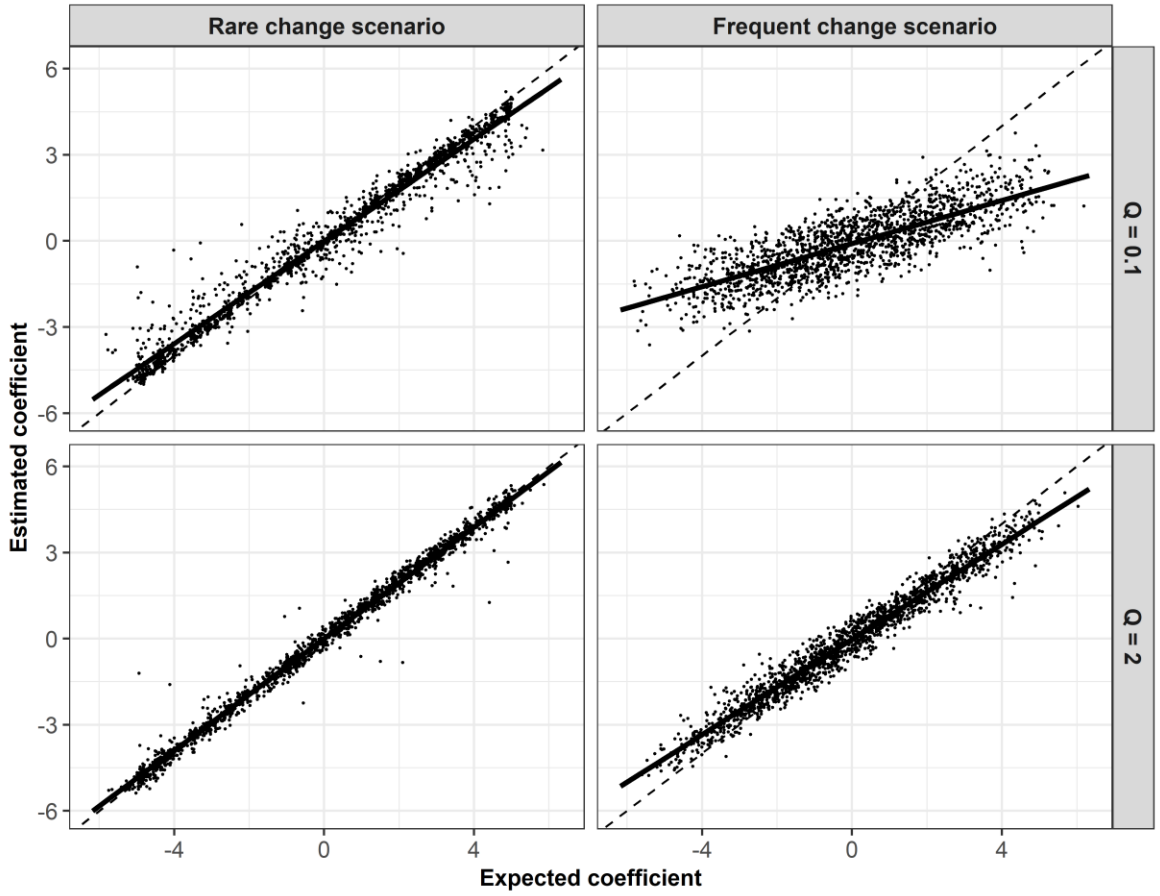

Figure S3. Comparison between the estimated and expected coefficients of habitat selection, according to the value of the wiggliness parameter *Q* used in the dynamic logistic model. High-wiggliness models performed better than low-wiggliness models to accurately estimate time-varying coefficients of habitat selection, both when habitat selection changes rarely and frequently over time.

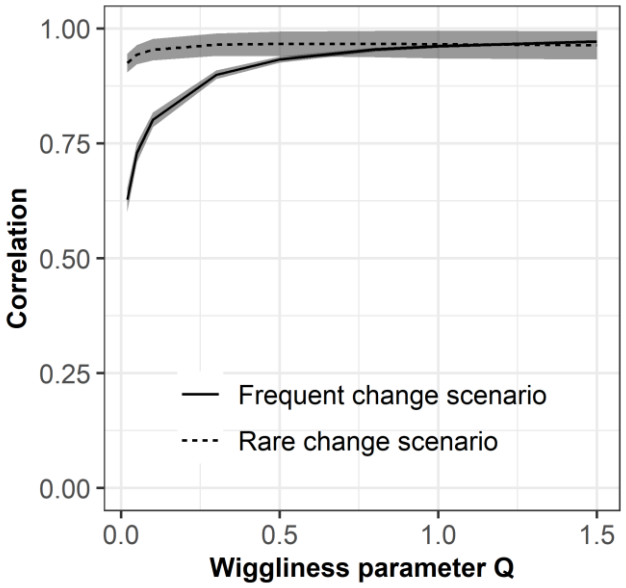

Figure S4. Relationship between the value of the model wiggliness parameter *Q* and the correlation between the expected time-varying selection strength and the average time-varying selection strength estimated on 100 replicates on 40 different landscapes, according to the frequency of change in habitat selection. Time-varying HSA was not sensitive to the choice of model wiggliness to estimate rare changes of habitat selection. On the contrary, high-wiggliness models performed better than low-wiggliness models to estimate frequent changes of habitat selection.