Supporting Information

Demographic consequences of changing environmental periodicity, *Ecology*
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Appendix S5 - Selection of highly- and little-seasonal years for a given vital rate in the marmot and meerkat populations.

Data (Conquet et al. 2022a) are available in Dryad at https://doi.org/10.5061/dryad.hhmgqnkkc and code (Conquet et al. 2022b) is available in Zenodo at https://doi.org/10.5281/zenodo.7078560.

To attribute a high or low seasonality to marmot and meerkat vital rates, we first computed each year's absolute change between the seasonal vital rates. That is, we used the coefficients of the two seasons from the GLMM fitted for a given vital rate, which we transformed using the response scale (i.e., using the inverse function of the model link function: logistic for the binomial distribution, exponential for the Poisson distribution) in order to obtain the real vital-rate estimate. For example, in the yellow-bellied marmot population, we computed the absolute change of reproductive adult survival between summer (S) and winter (W) as

$$\text{abs. change} = \text{abs}(\text{estimate}_{\text{S}} - \text{estimate}_{\text{W}}) = \text{abs}(\text{logistic}(\text{intercept} + \text{slope}_{\text{S}}) - \text{logistic}(\text{intercept}))$$

(Equation S1)

In this example, we use the logistic function, which is the inverse of the logit function used in GLMMs of the binomial family (e.g., for survival or transitions). The intercept is the vital-rate estimate in winter and slope_{S} is the slope between the seasonal vital rates. From the distribution of all yearly absolute seasonal changes, we obtained the 50% quantile and used it as a threshold to determine whether a vital rate in a given year was highly (HS; above the threshold) or little seasonal (LS; below the threshold; see Fig. S1

and the R code). In every HS and LS year for each vital rate, we preserved intra-annual vital-rate correlation by constructing the matrix population model (MPM) using estimates from the same year for all vital rates. Consequently, a HS year for a focal vital rate could also be a HS year for another.

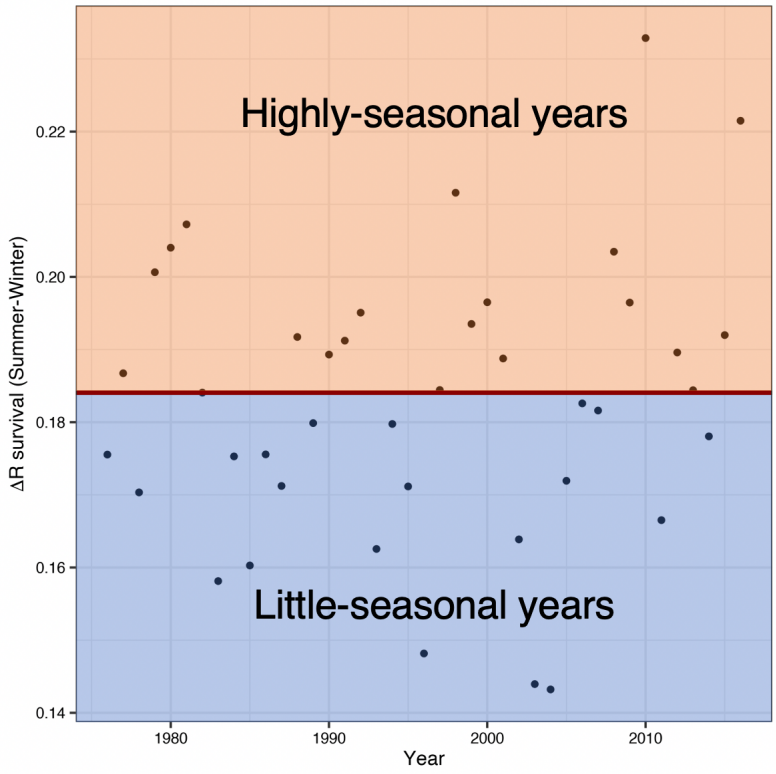

Figure S1 - Selection of highly- and little-seasonal years for reproductive adult survival in the yellow-bellied marmot population. The figure represents the distribution of all yearly absolute changes between summer and winter survival of reproductive (R) adults in the yellow-bellied marmot population. The red line represents the 50% quantile of this distribution, which we used as a threshold to determine whether R survival in a single year was highly (HS; above the threshold) or little seasonal (LS; below the threshold).

References – Appendix S5

Conquet, E., A. Ozgul, D. T. Blumstein, K. B. Armitage, M. K. Oli, J. G. A. Martin, T. H. Clutton-Brock, and M. Paniw. 2022. “Demographic consequences of changes in environmental periodicity.” Dryad, dataset. https://doi.org/10.5061/dryad.hhmgqnkkc.

Conquet, E., A. Ozgul, D. T. Blumstein, K. B. Armitage, M. K. Oli, J. G. A. Martin, T. H. Clutton-Brock, and M. Paniw. 2022b. R code for Demographic consequences of changes in environmental periodicity. Zenodo, software. https://doi.org/10.5281/zenodo.7078560.