

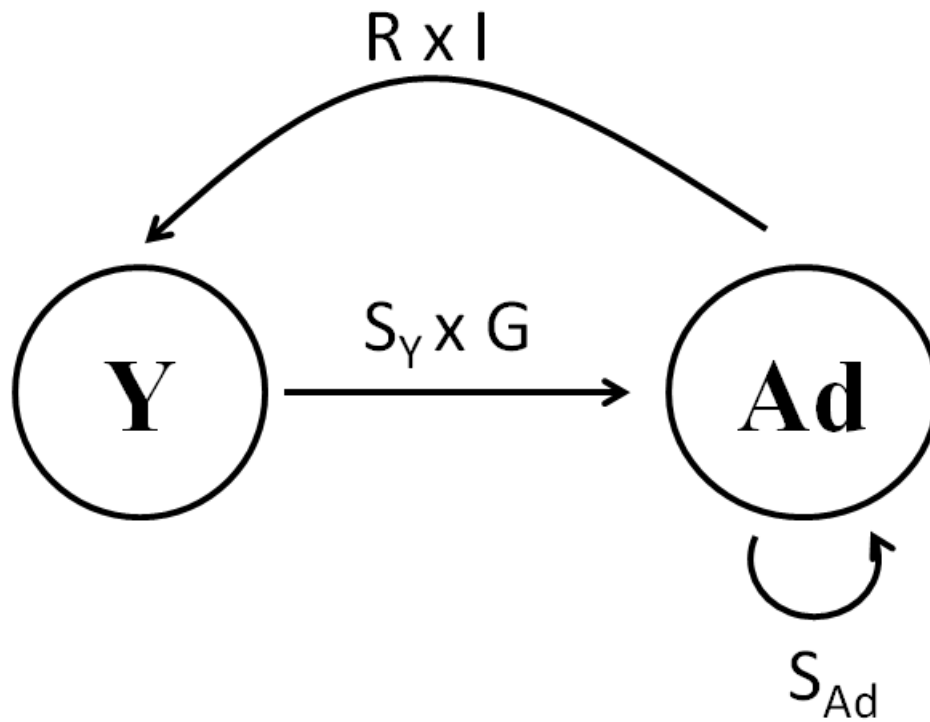
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**Floriane Plard, Jean-Michel Gaillard, Tim Coulson, A. J. Mark Hewison, Mathieu Douhard, Francois Klein, Daniel Delorme, Claude Warnant and Christophe Bonenfant. 2015. The influence of birth date via body mass on individual fitness in a long-lived mammal. *Ecology* 96:1516-1528.**

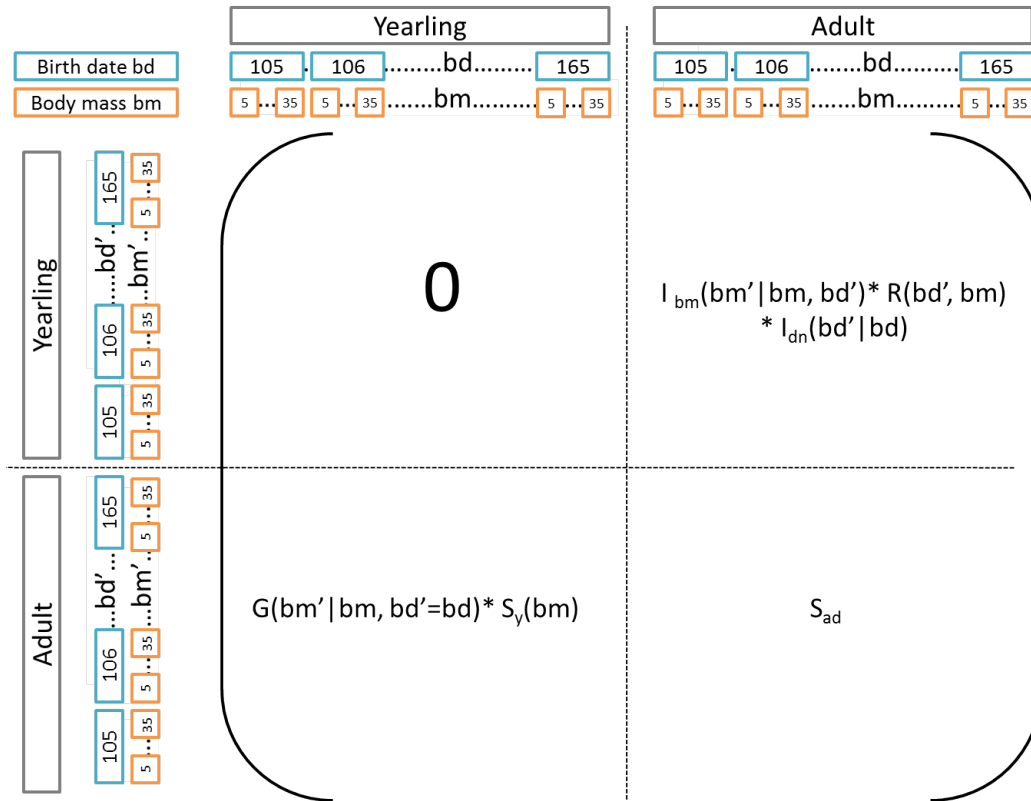
Appendix B. Description of the different functions and of the matrix used to build the IPM.

**Table B1.** Models of the five functions used to build the IPM describing the contemporaneous distributions of birth date ( $BD$ ) and body mass ( $BM$ ).  $M$ : Maternal,  $Y$ : Yearling,  $Ad$ : Adult.

<b>recruitment (early survival)</b>	$R(BM_M, BD) = \frac{1}{1+e^{-(-0.24+0.25*BM_M-0.04*BD)}}$
<b>growth</b>	$G(BM_{Ad} BM_Y, BD) = \frac{1}{\sqrt{2\pi*1.52}} e^{-\frac{(BM_{Ad}-(19.49+0.63*BM_Y-0.05*BD))^2}{2*1.52^2}}$
<b>inheritance BD</b>	$I_{BD}(BD BD_M) = \frac{1}{\sqrt{2\pi*4.65}} e^{-\frac{(BD-(112.9+0.17*BD_M))^2}{2*4.65^2}}$
<b>inheritance BM</b>	$I_{BM}(BM_Y BM_M, BD) = \frac{1}{\sqrt{2\pi*1.26}} e^{-\frac{(BM_Y-(20.90+0.39*BM_M-0.09*BD))^2}{2*1.26^2}}$
<b>survival</b>	$S_Y(BM_Y) = \frac{1}{1+e^{-(-4.24+0.53*BM_Y)}}$ $S_{Ad} = 0.82$



**Figure B1.** A life-cycle of roe deer including two age-classes: yearling and adult female roe deer. This cycle corresponds to the special case of a reduced life-cycle describing a population with two age-classes where maximizing reproductive value reliably corresponds to maximizing fitness (Caswell 2001). The other condition that has to be met for reliably using reproductive values as fitness measures identified that the adult survival is not sensitive to any source of variation (Caswell 2001). As for most long-lived herbivores (Gaillard and Yoccoz 2003), this assumption is also met in roe deer for which adult survival is high and constant across different environments.  $R$ : Recruitment,  $I$ : Inheritance,  $G$ : Growth,  $S_Y$ : Yearling survival,  $S_{Ad}$ : Adult survival.



**Figure B2.** Representation of the matrix used to build the IPM.

## LITERATURE CITED

Caswell, H., 2001. Matrix population models : construction, analysis, and interpretation. Sinauer Associates, Sunderland, Mass., second edition.

Gaillard, J.-M. and N. G. Yoccoz, 2003. Temporal variation in survival of mammals: a case of environmental canalization? *Ecology* 84:3294–3306.