

Formulas*discrete time growth:*

- $N_T = N_0 \lambda^T$
- $\lambda = f + p$
- $\mathcal{R} = f/(1 - p)$

continuous time growth:

- $N(t) = N(0) \exp(rt)$
- $r = b - d$
- $\mathcal{R} = b/d$

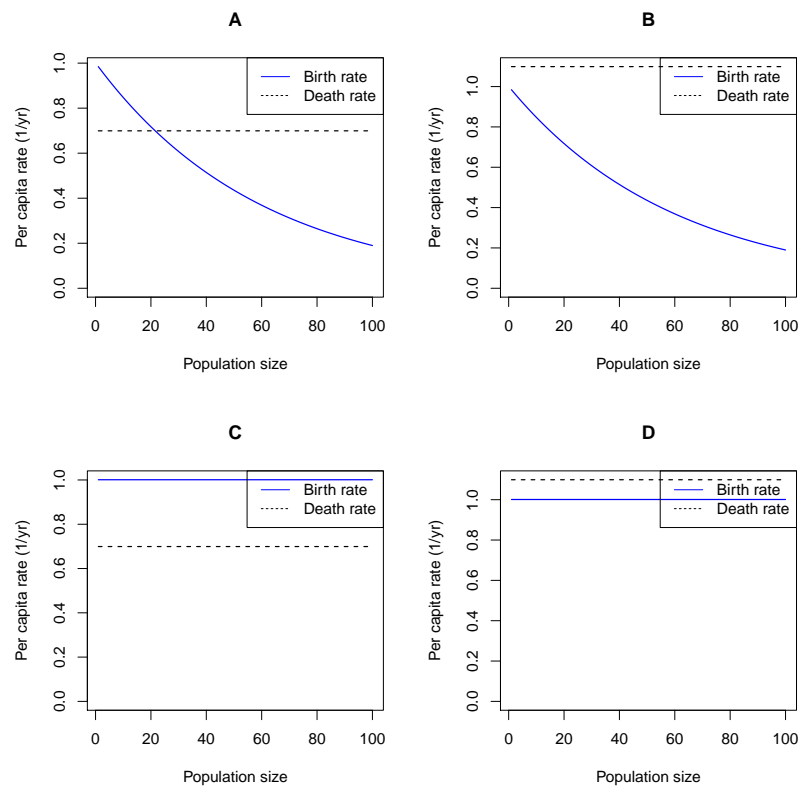
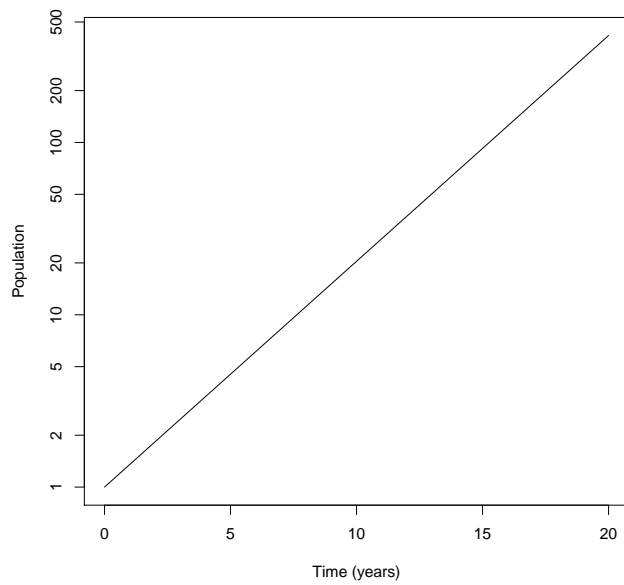
structured growth:

- $\ell_x = p_1 \times p_2 \times \dots p_{x-1}$
- $\mathcal{R} = \sum \ell_x f_x$
- $\sum \ell_x f_x \lambda^{-x} = 1$
- $\text{SAD}(x) \propto \ell_x \lambda^{-x}$

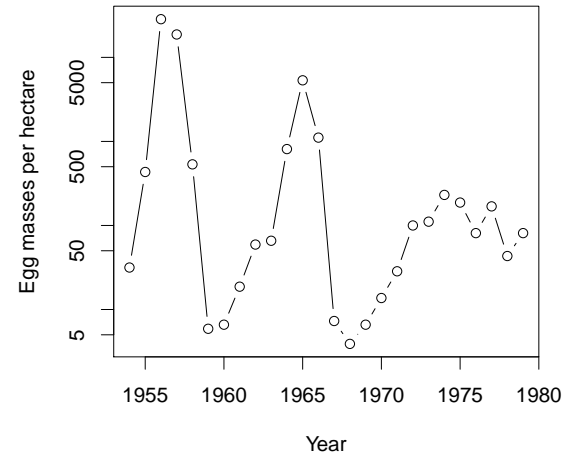
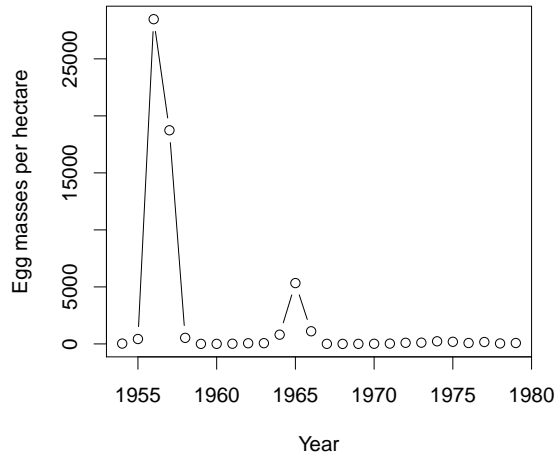
competition:

- α_{ij} = effect **of** species i **on** species j
- $C = \alpha_{12} \alpha_{21}$
- $E_{ij} = \alpha_{ij} K_i / K_j$

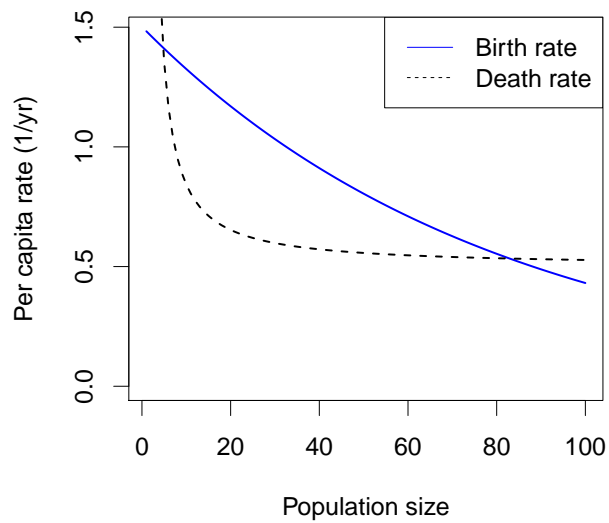
Increase

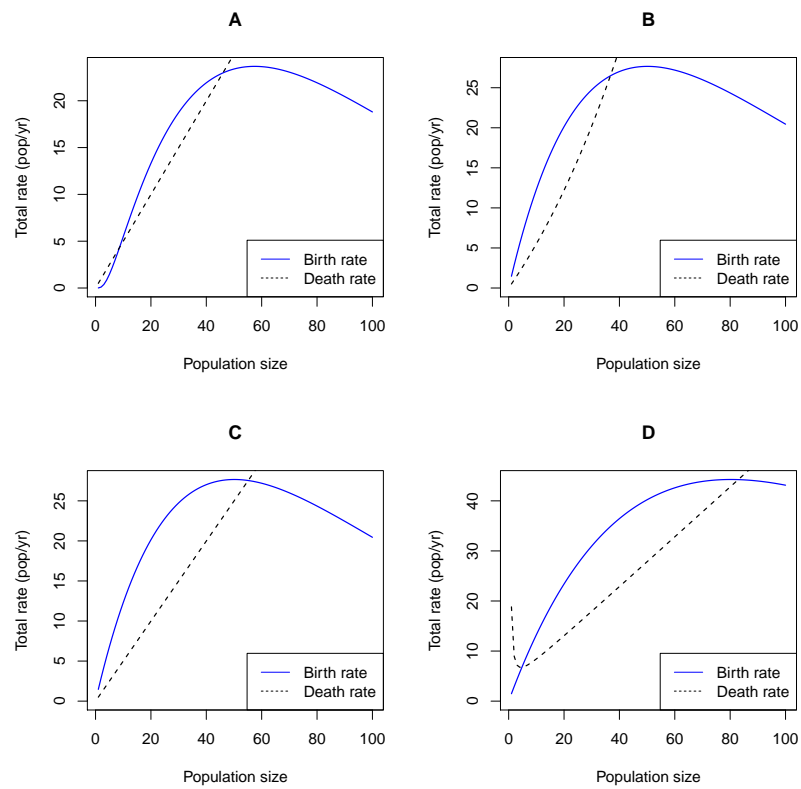


Gypsy

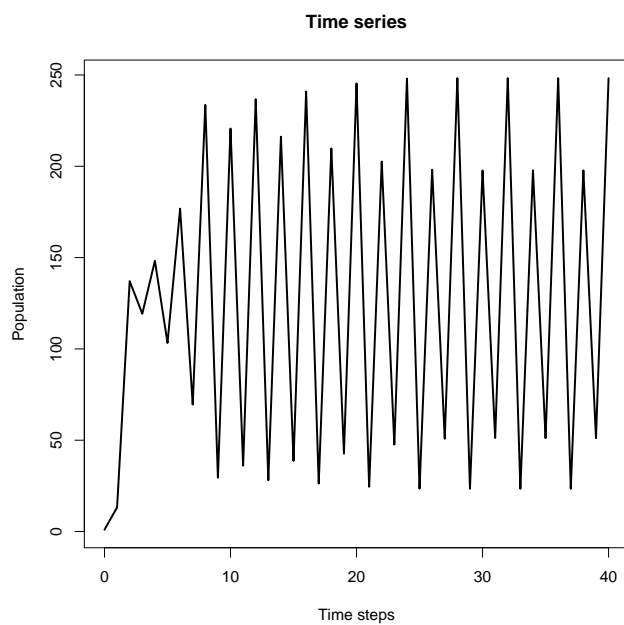


Rates

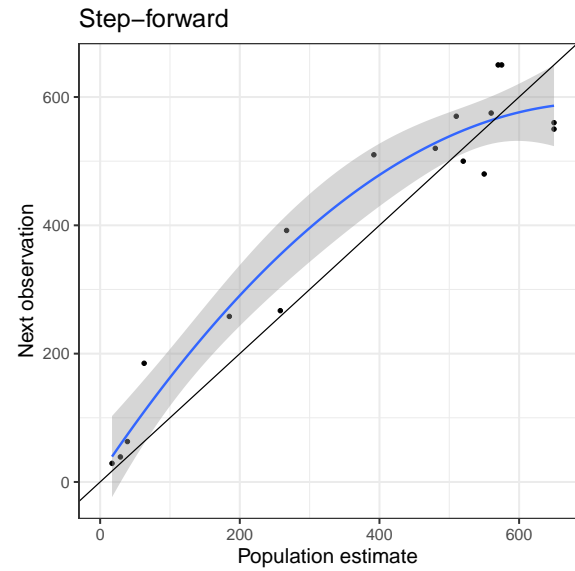
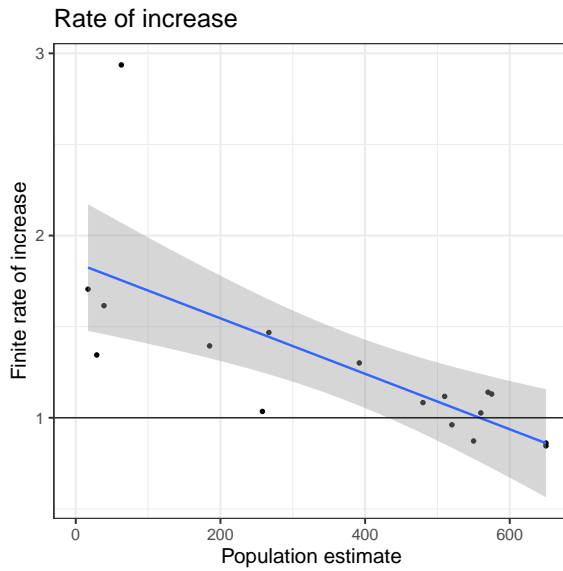




Cycles



Paramecia



Competition

