

# BauchModel\_2

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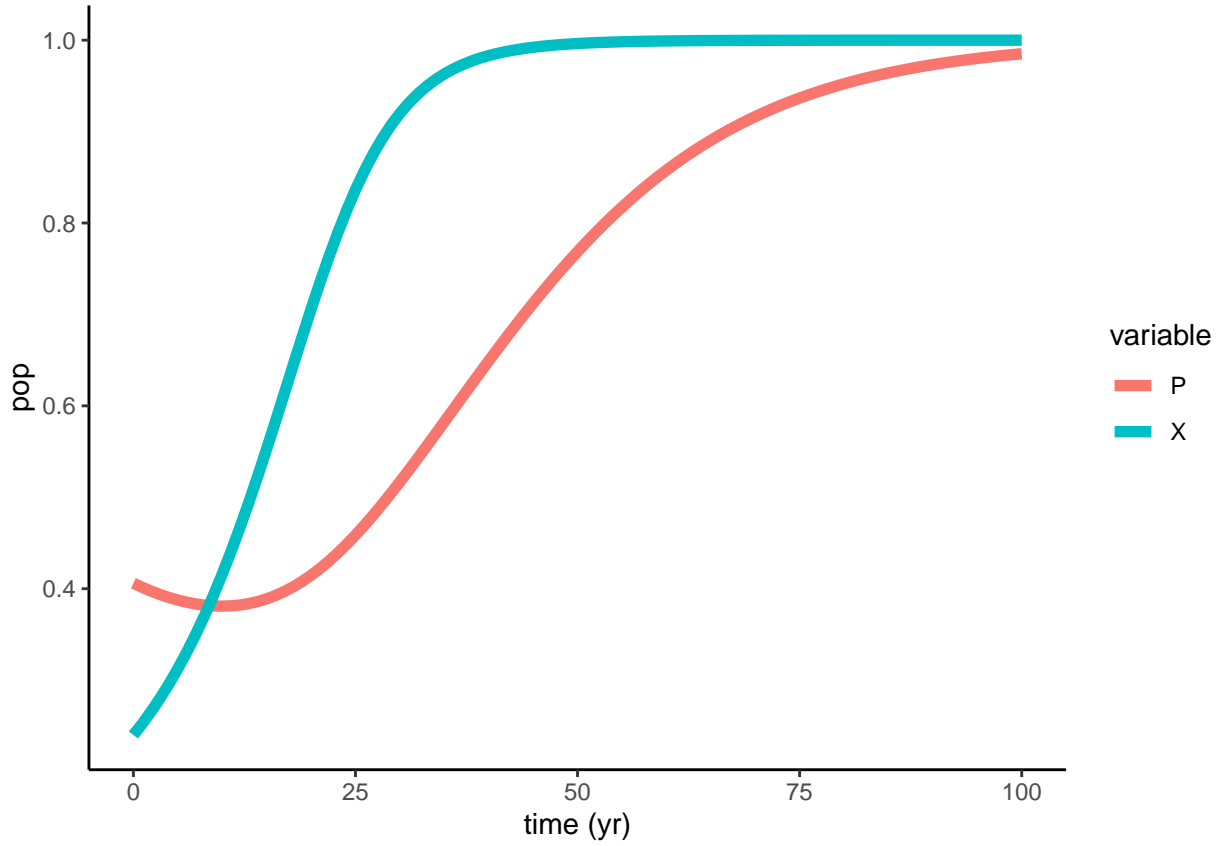


Figure 1: Original Bauch Model

See derivation in notes but this is the new equations (still unsure about interaction terms):

$$\frac{dP_1}{dt} = r_1 P_1 (1 - P_1) - \frac{h_1 * P_1 (1 - X_1)}{P_1 + s_1} + \rho_1 * \frac{P_2 - P_1}{2}$$

$$\frac{dX_1}{dt} = k_1 X_1 (prop_1 - X_1) X_2 (prop_2 - X_2) \left[ \frac{1}{P_1 + c_1} - w_1 + d_1 (2X_1 - prop_1) + d_2 (2X_2 - prop_2) \right]$$

$$\frac{dP_2}{dt} = r_2 P_2 (1 - P_2) - \frac{h_2 * P_2 (1 - X_2)}{P_2 + s_2} + \rho_2 * \frac{P_1 - P_2}{2}$$

$$\frac{dX_2}{dt} = k_1 X_1 (prop_1 - X_1) X_2 (prop_2 - X_2) \left[ \frac{1}{P_2 + c_2} - w_2 + d_1 (2X_1 - prop_1) + d_2 (2X_2 - prop_2) \right]$$

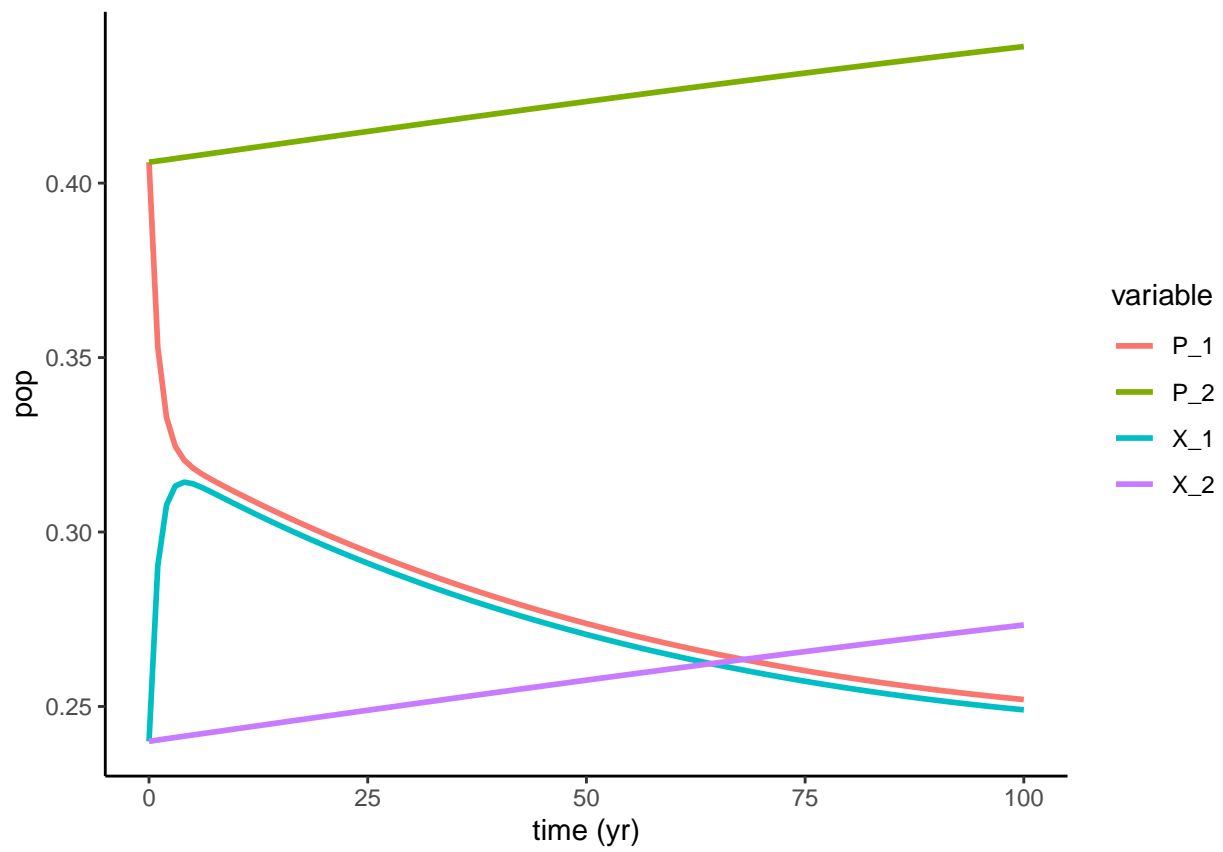


Figure 2: New Model with default paramters

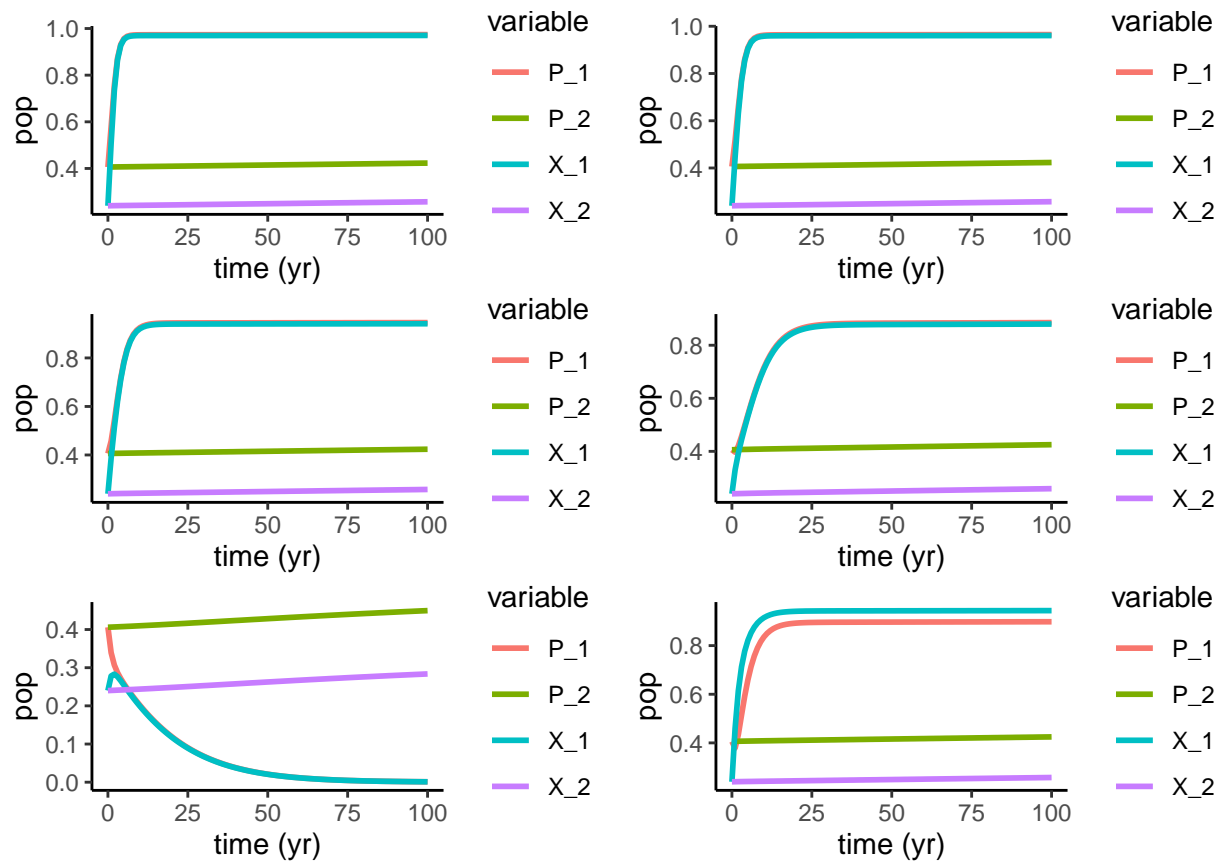


Figure 3: R - Net growth/fecundity, range 0 to 1

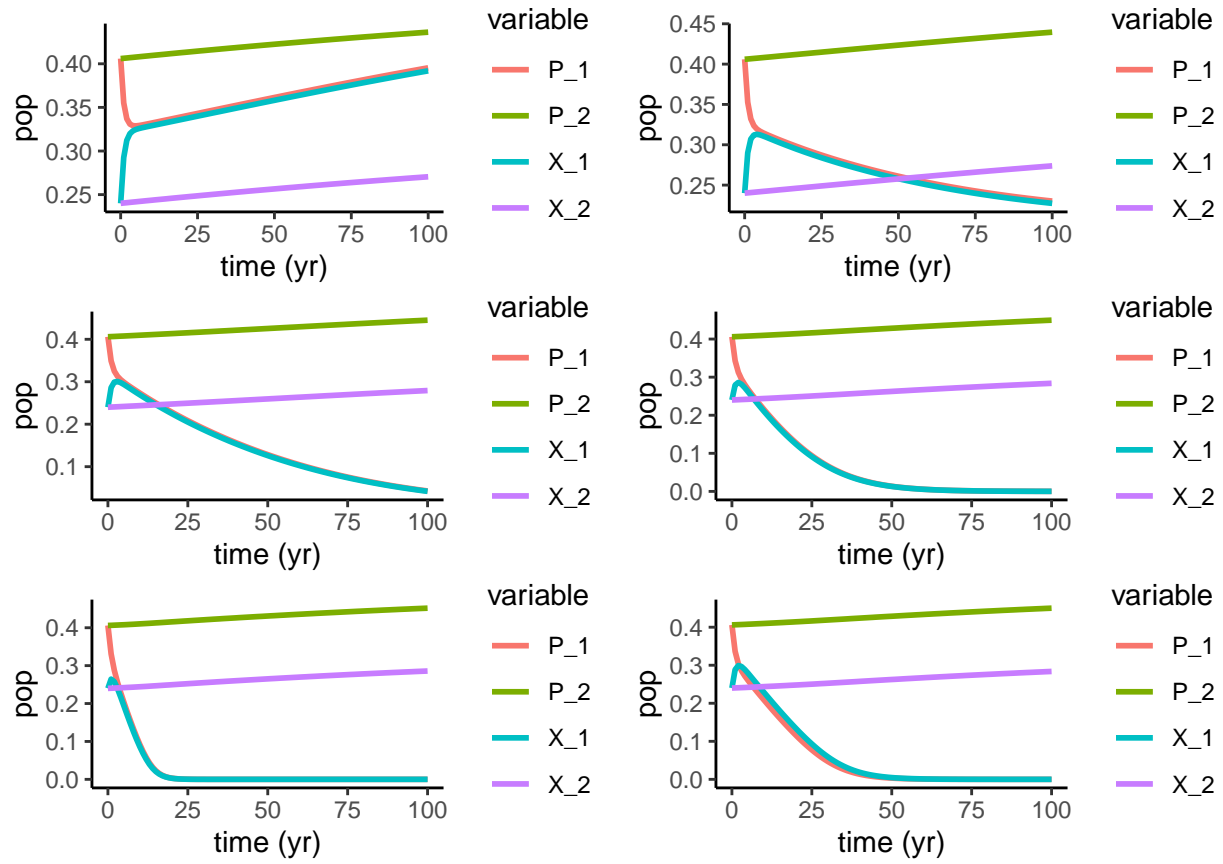


Figure 4: S - supply and demand, range 0.1 to 1

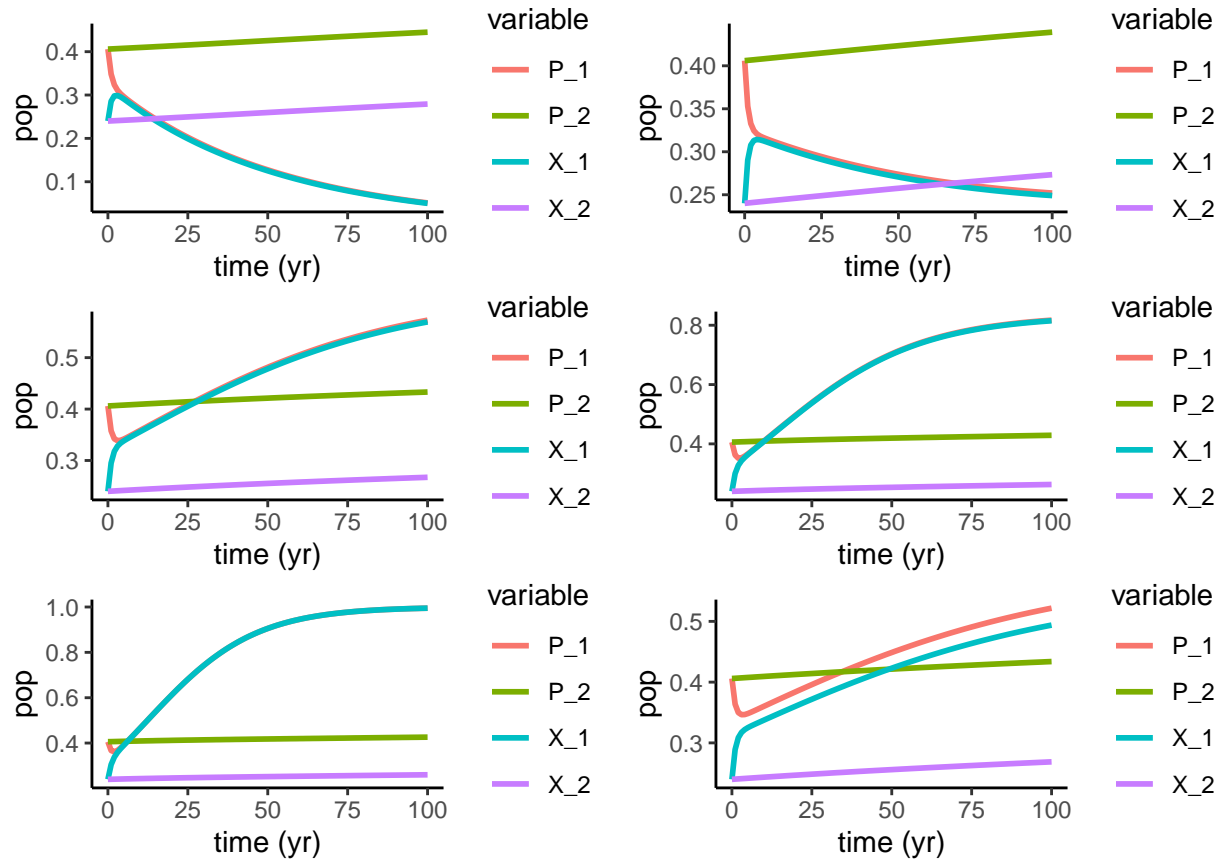


Figure 5:  $h$  - Harvesting efficiency, range 0 to 0.1. Note, default is .075

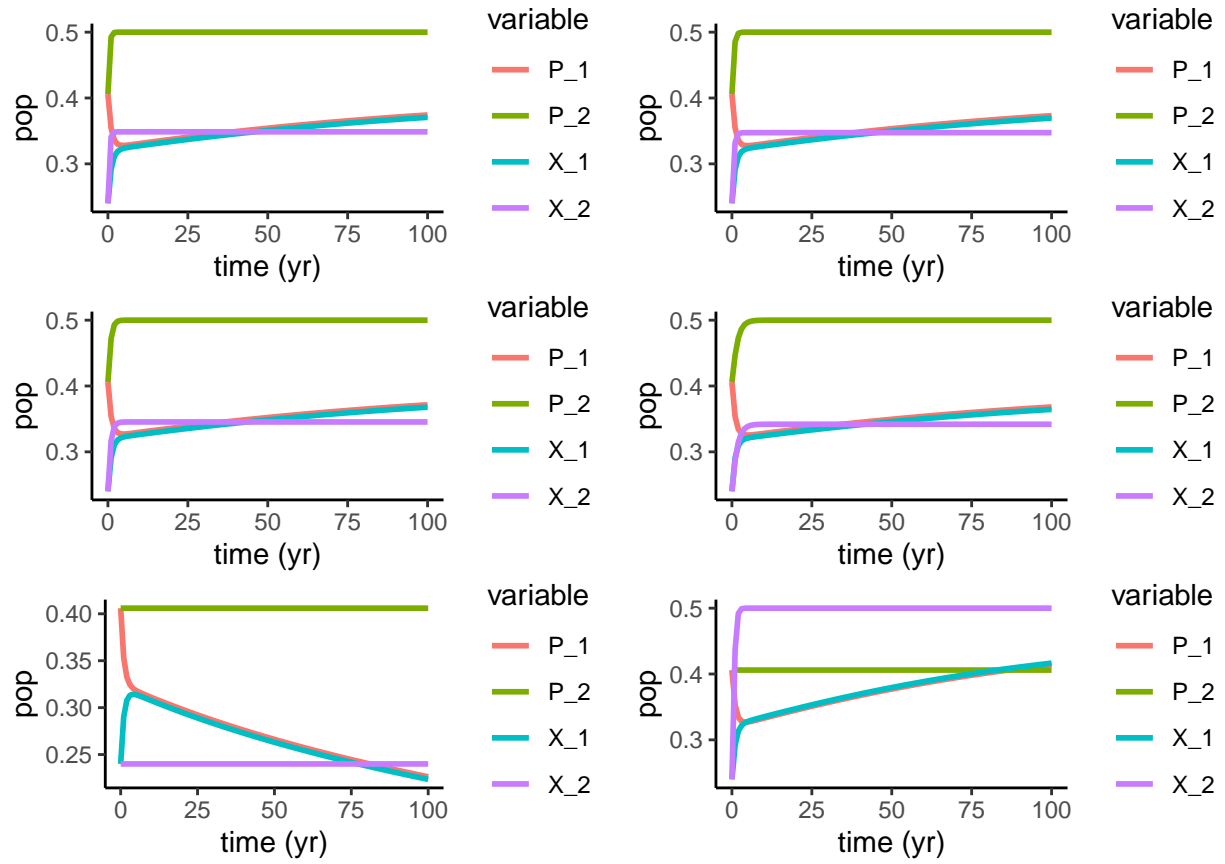


Figure 6: K - Social learning rate 0 to 100

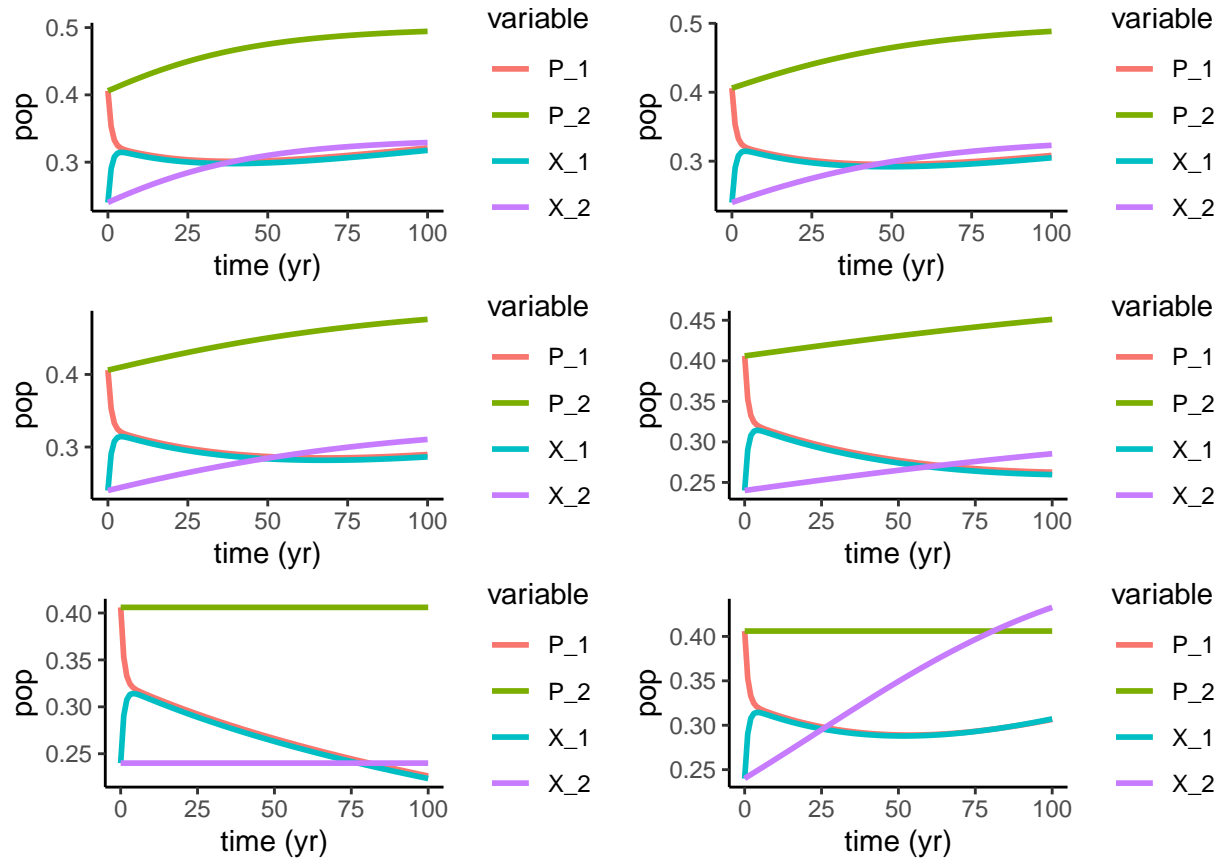


Figure 7: K - Social learning rate 0 to 1

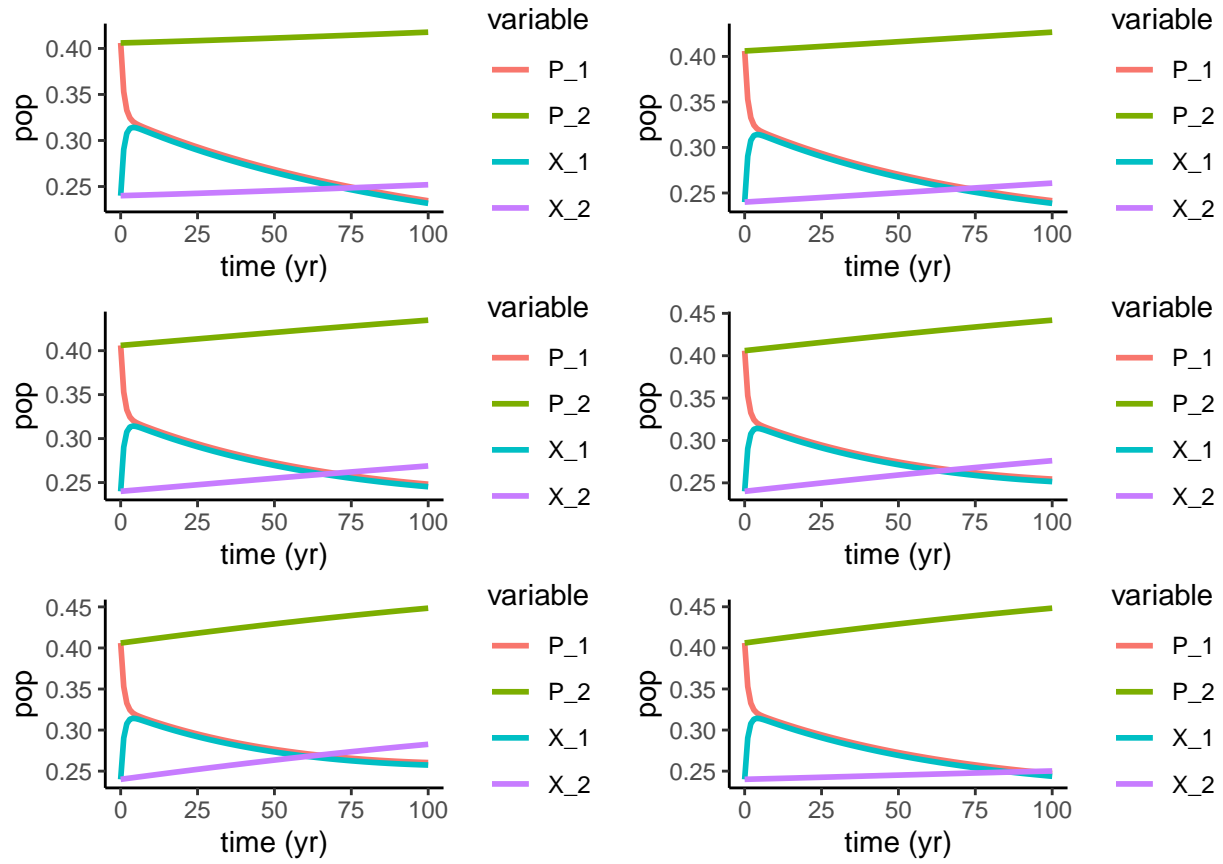


Figure 8: w - conservation costs



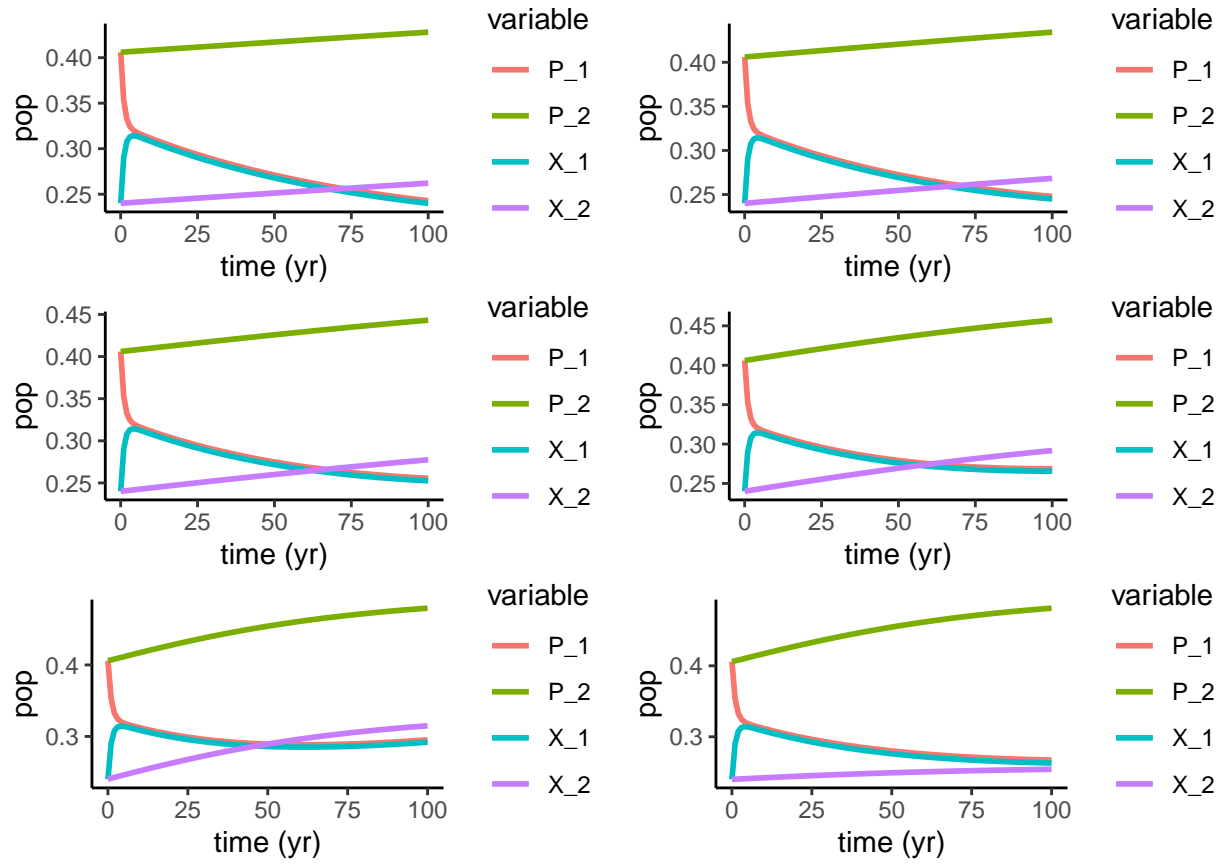


Figure 9: c - rarity valuation param

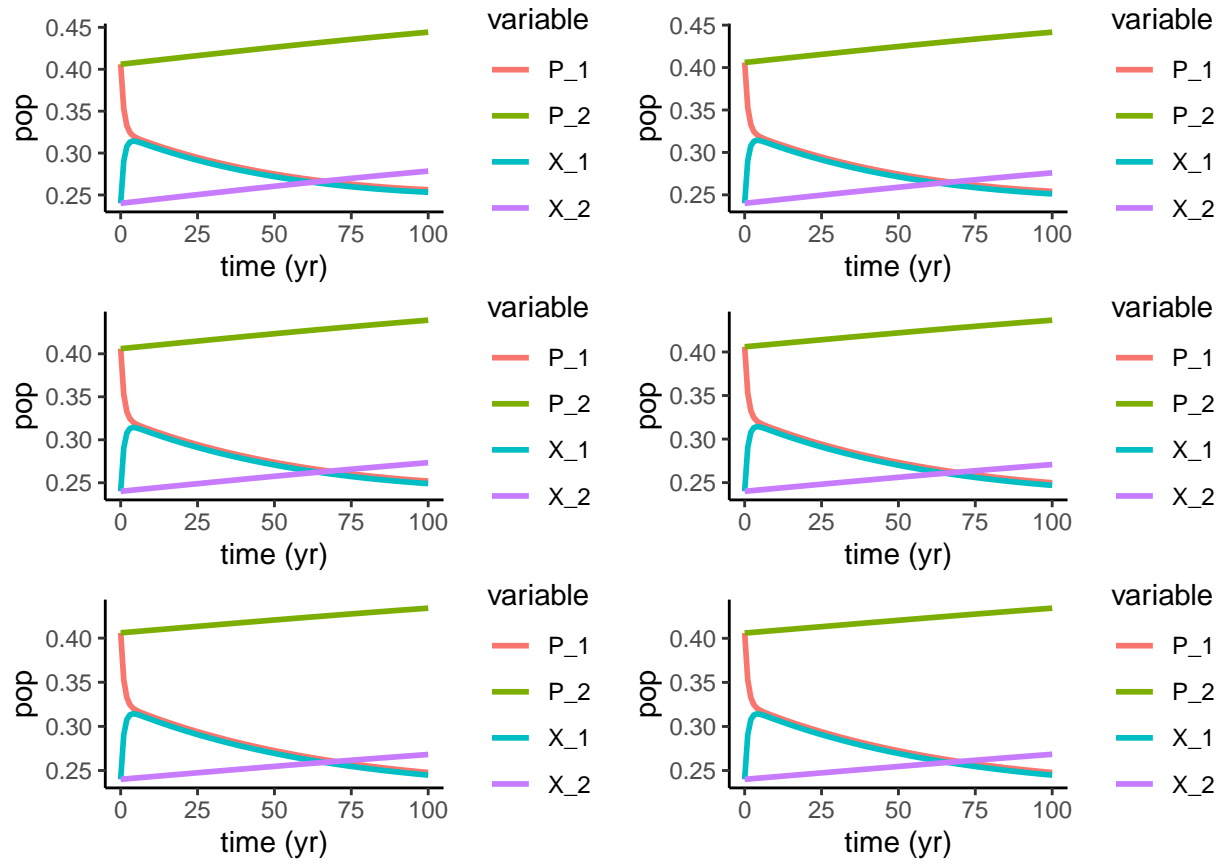


Figure 10:  $d$  - social norm strength

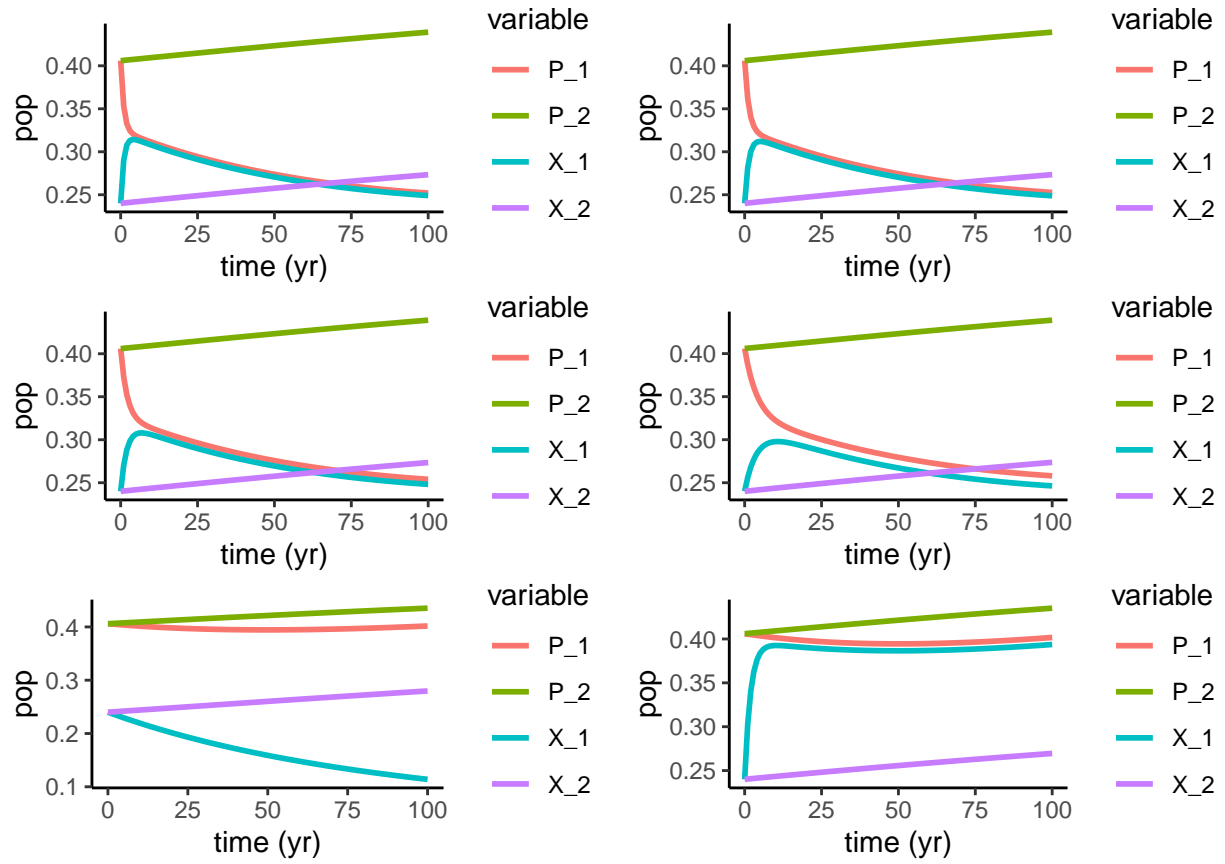


Figure 11: roe - fish diffusion