Social-ecological models with social hierarchy and space applied to small scale fisheries

Sophie Wulfing[1]* and Easton R. White[1]

[1]Department of Biological Sciences, University of New Hampshire, 03824, NH, USA

* Corresponding authors: Sophie Wulfing (SophieWulfing@gmail.com) and Dr. Easton White (Easton.White@unh.edu)

1 Equations 2), 4), and 5) are as follows:

$$\frac{dX_i}{dt} = k_i X_i (1 - X_i)[U_{A,i} - U_{B,i}] \tag{2}$$

$$U_{A,i} = \frac{1}{(F_i + c_i)} + d_i X_i + \rho_i X_j \tag{4}$$

$$U_{B,i} = \omega_i + d_i(1 - X_i) + \rho_i(1 - X_j) \tag{5}$$

2 Substituting equations 4) and 5) into equation 2 Gives:

3 $\frac{dX_i}{dt} = k_i X_i (1 - X_i)[\frac{1}{(F_i + c_i)} + d_i X_i + \rho_i X_j - \omega_i - d_i(1 - X_i) - \rho_i(1 - X_j)]$

4 $\frac{dX_i}{dt} = k_i X_i (1 - X_i)[\frac{1}{(F_i + c_i)} - \omega_i + d_i(X_i - 1 + X_i) + \rho_i(X_j - 1 + X_j)]$

5 $\frac{dX_i}{dt} = k_i X_i (1 - X_i)[\frac{1}{F_i + c_i} - \omega_i + d_i(2X_i - 1) + \rho_i(2X_j - 1)]$
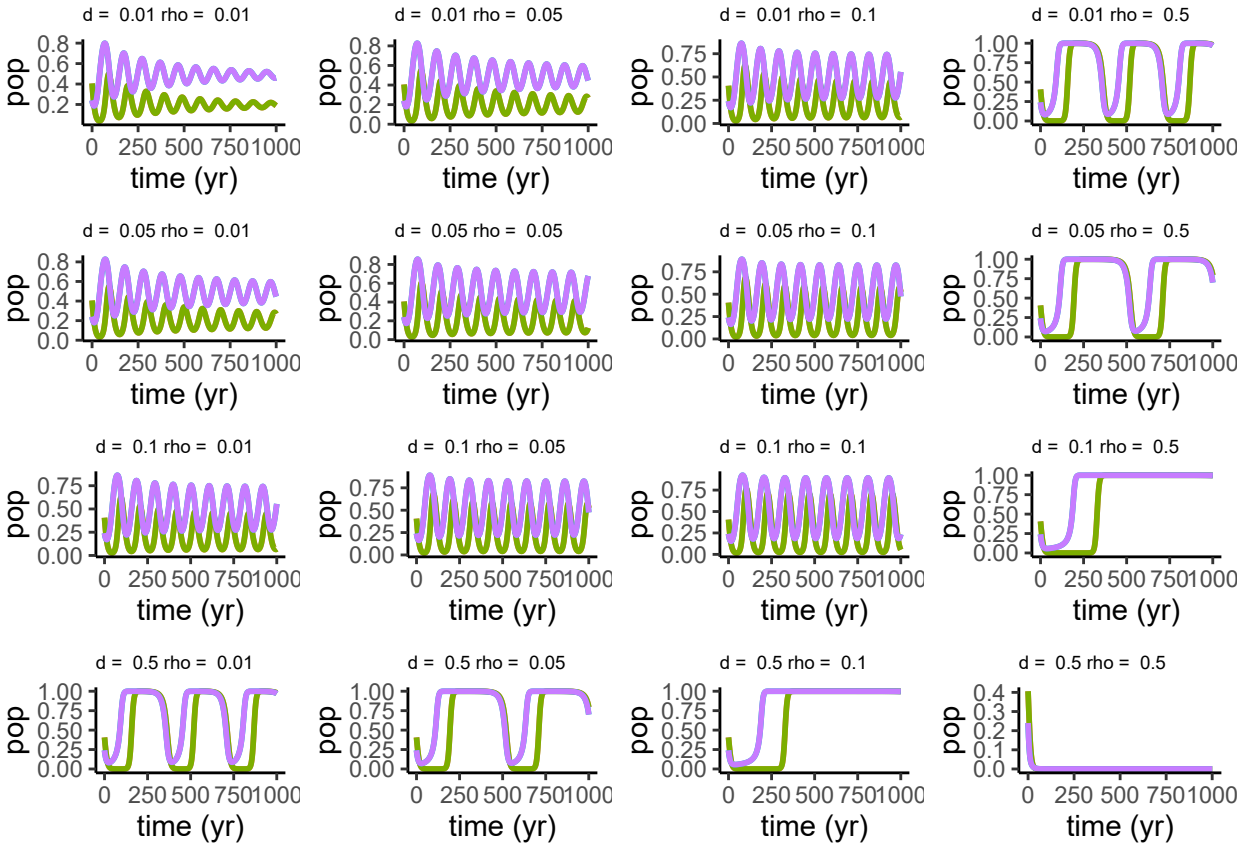
1 Inside vs. Outside social influence with symmetry

Figure 1: This is just demonstrating that with symmetry in conditions, d and rho actually have the same affect. APPENDIX MATERIAL