BauchModel_DefaultParamsHighMovement

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Table 1: Parameter values used in this analysis

Parameter	Population_1	Population_2	Def
r	0.06	0.06	Fish net growth
s	0.8	0.8	Supply and demand
h	0.1	0.1	Harvesting efficiency
k	0.17	0.17	Social learning rate
w	1	1	Conservation cost
c	0.6	0.6	Rarity valuation
d	0.3	0.3	Social norm strength (within pop)
i	0	0	Fish immigration (from opposite patch)
rho	0	0	Social norm strength (opposite pop)

Table 2: Starting values used in this analysis

Parameter	Population_1	Population_2
F	0.406	0.406
X	0.240	0.240

SCENARIO: OSCILLATIONS

Function:

$\frac{dP_1}{dt} = r_1 P_1(1 - P_1) - \frac{h_1 * P_1(1-X_1)}{P_1+s_1} - e_1 P_1 + i_1 P_2$

$\frac{dP_2}{dt} = r_2 P_2(1 - P_2) - \frac{h_2 * P_2(1-X_2)}{P_2+s_2} - e_2 P_2 + i_2 P_1$

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

$\frac{dX_2}{dt} = k_2 X_2(1 - X_2)[\frac{1}{P_2+c_2} - w_2 + d_2(2X_2 - 1) + prop_2(2X_1 - 1)]$

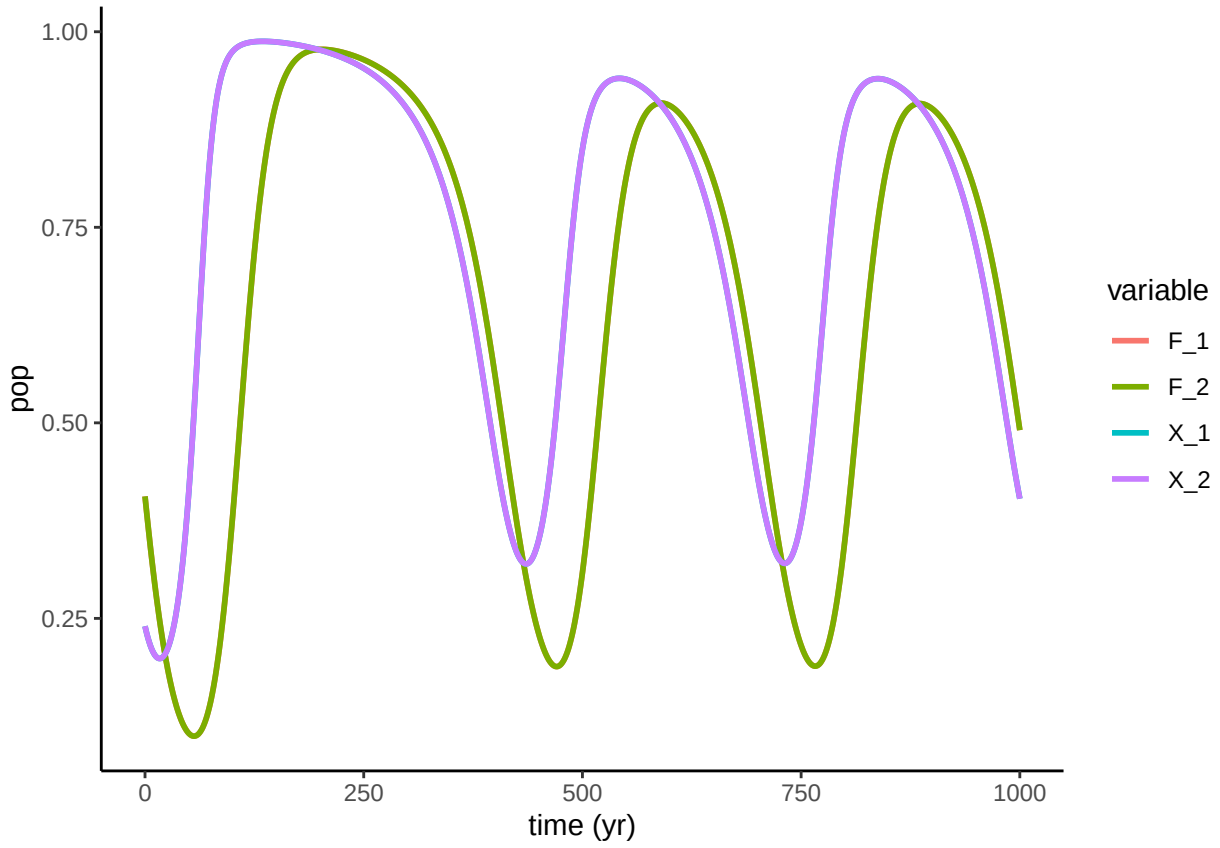


Figure 1: New Model with default paramters

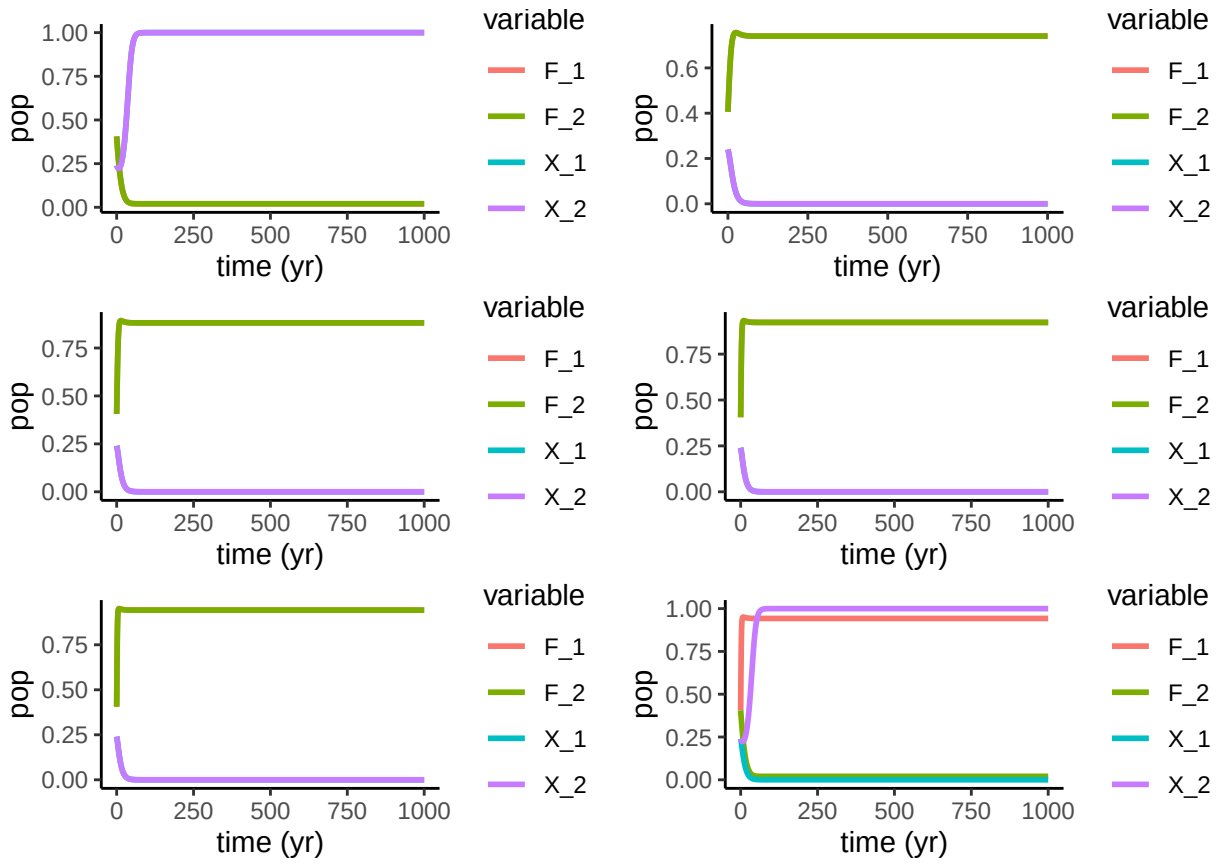


Figure 2: r - Net growth/fecundity, range 0 to 1

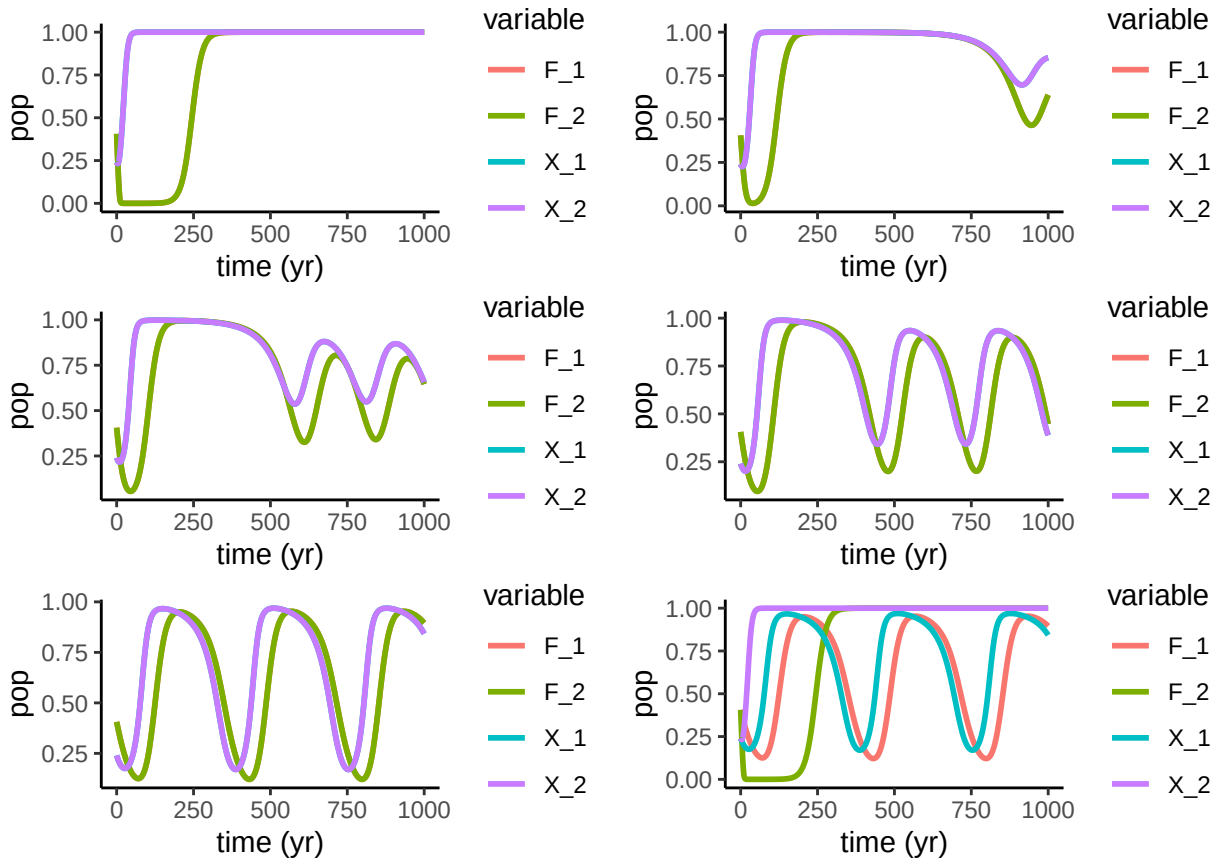


Figure 3: s - supply and demand, range 0.1 to 1

X2 and F2 have low supply and demand, therefore look like first graph
X1 and F1 are low and look more like the 5th graph

Low harvesting efficiency means everyone fishes while not affecting fish pop

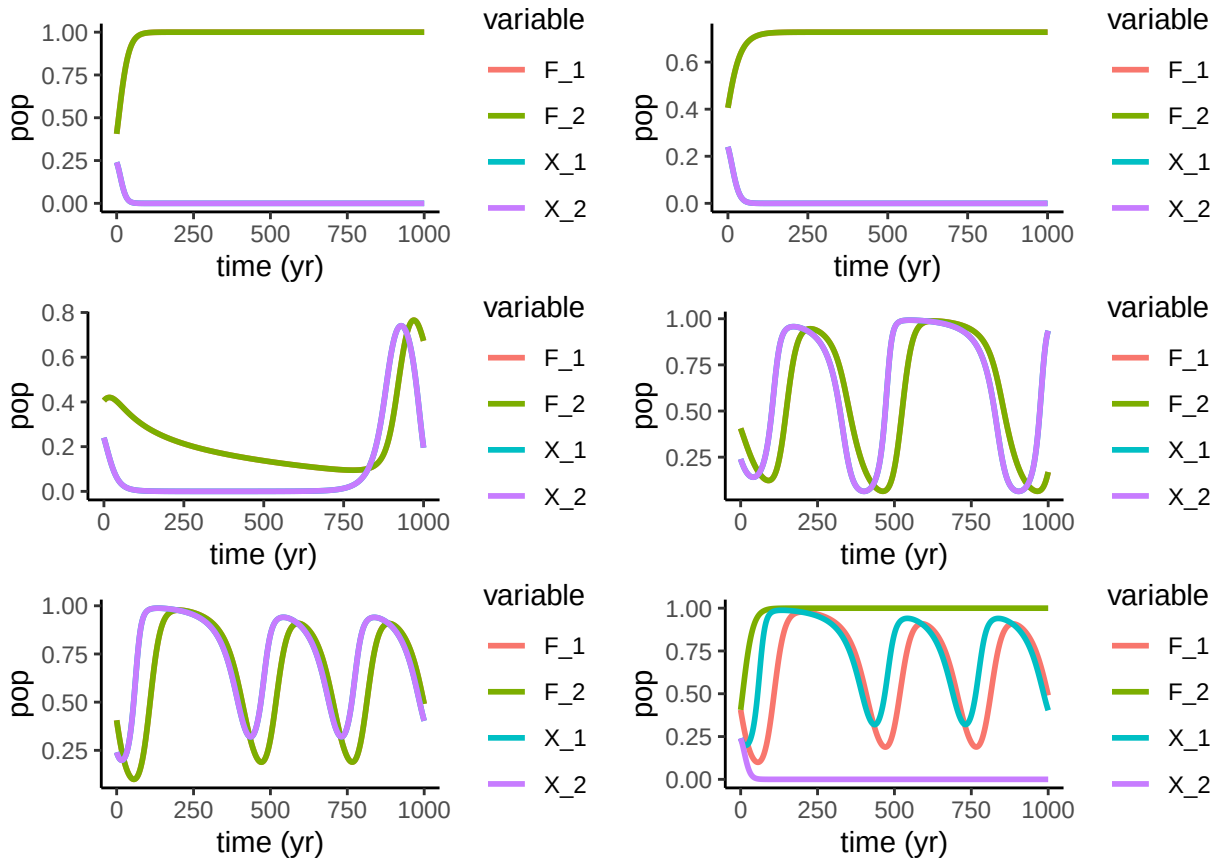


Figure 4: h - Harvesting efficiency, range 0 to 0.1. Note, default is .075

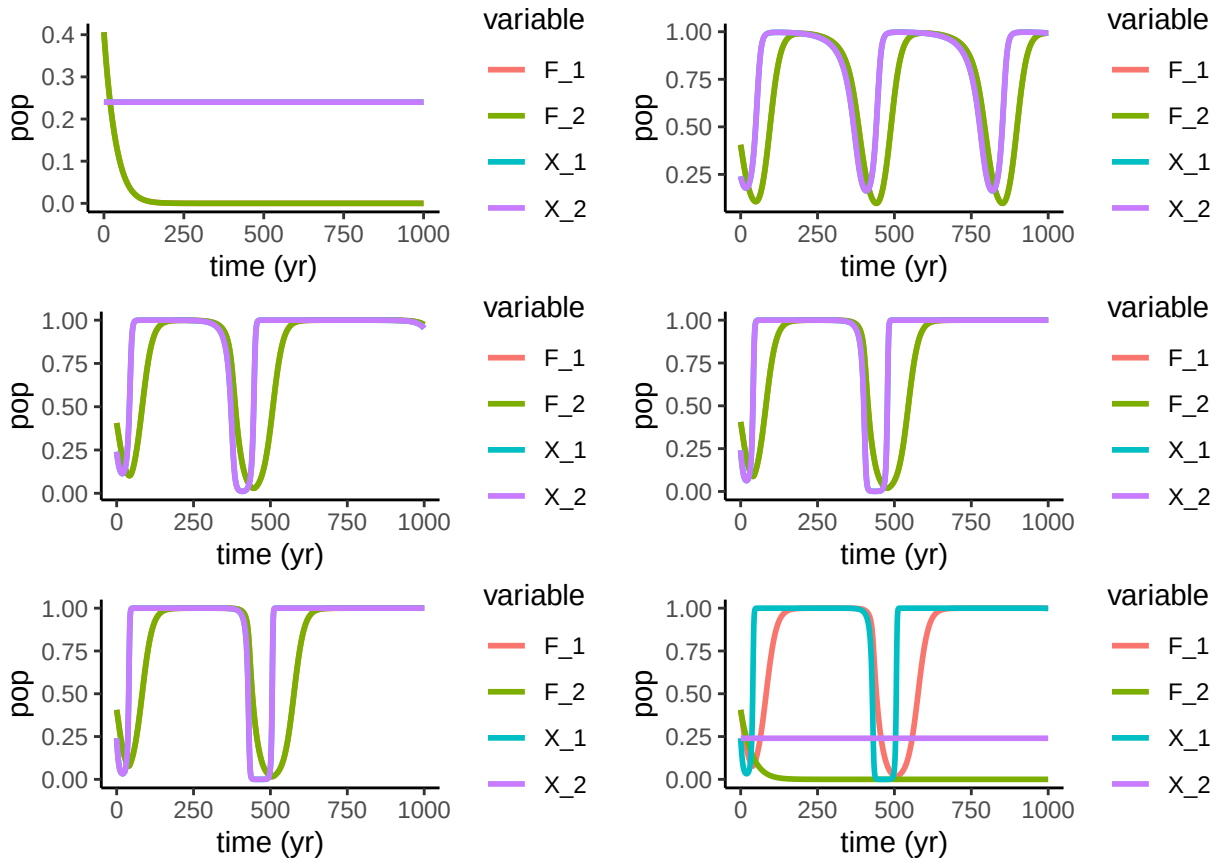


Figure 5: K - Social learning rate 0 to 1

Low social learning: increased frequency of oscilltations?

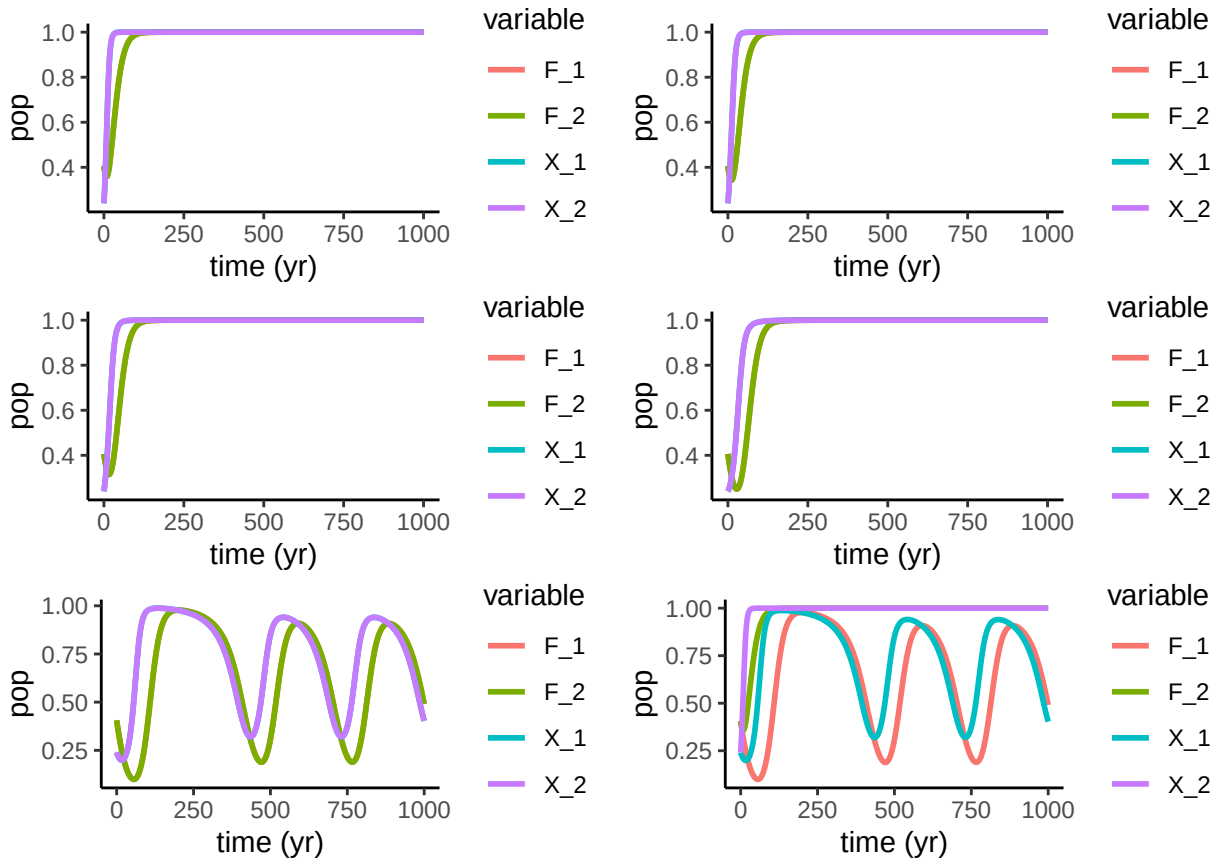


Figure 6: w - conservation costs

High conservation costs = more feedback

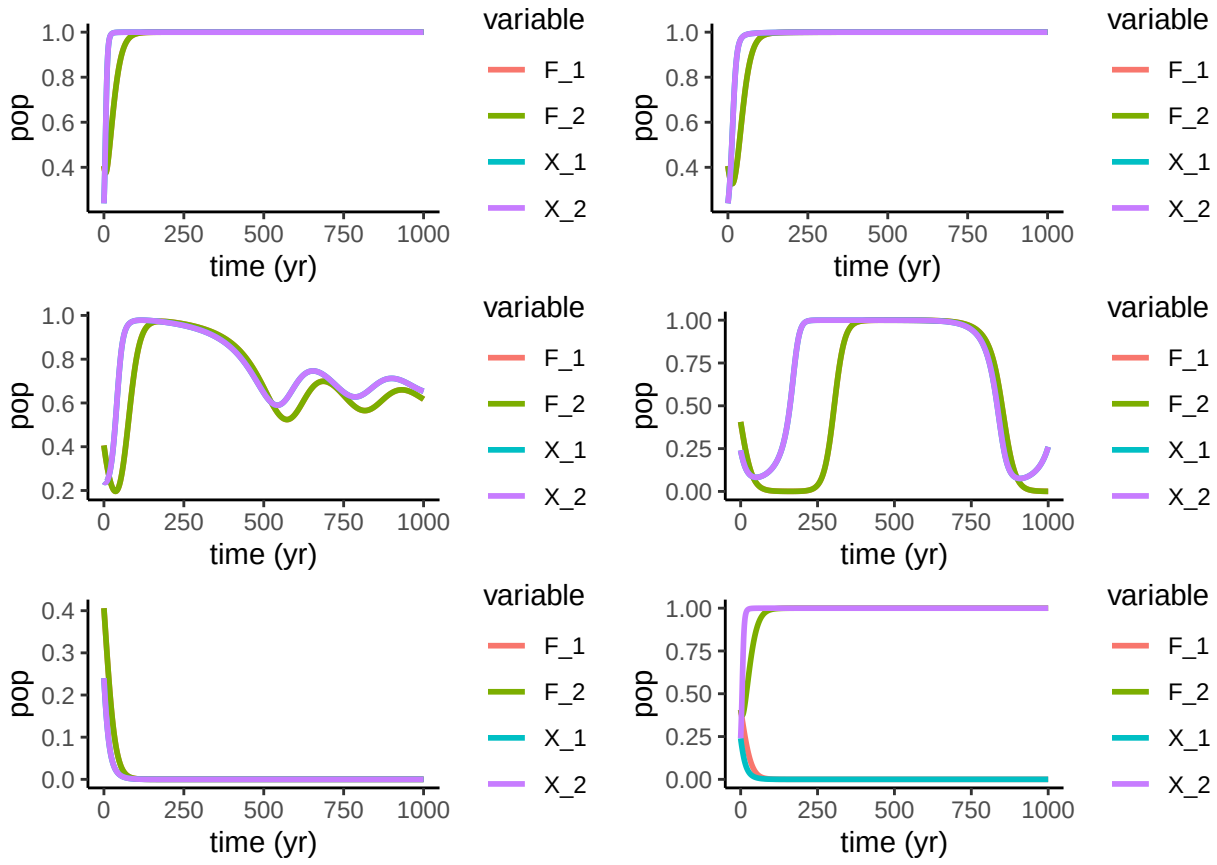


Figure 7: c - rarity valuation param

Perceived as more rare: fish survive

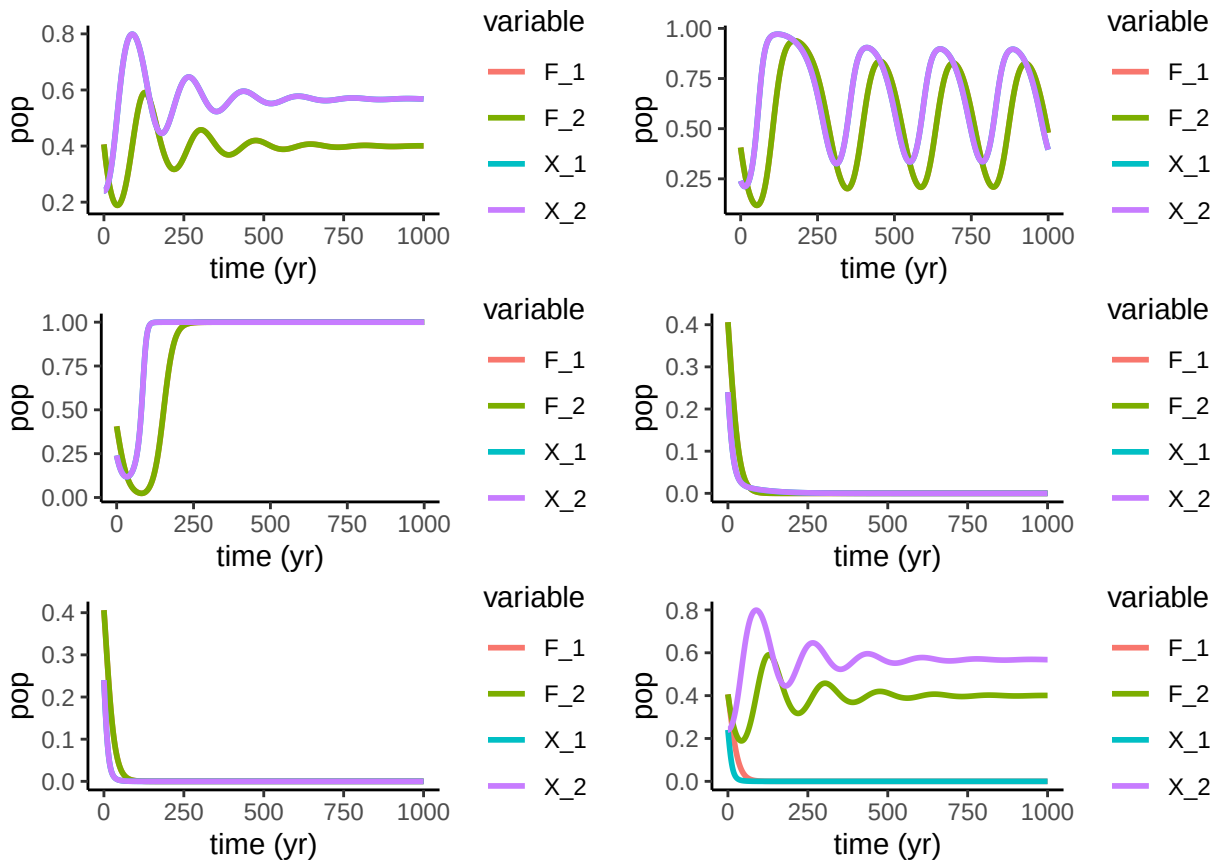


Figure 8: d - social norm strength

Higher internal social pressure eventually leads to stock collapse?>

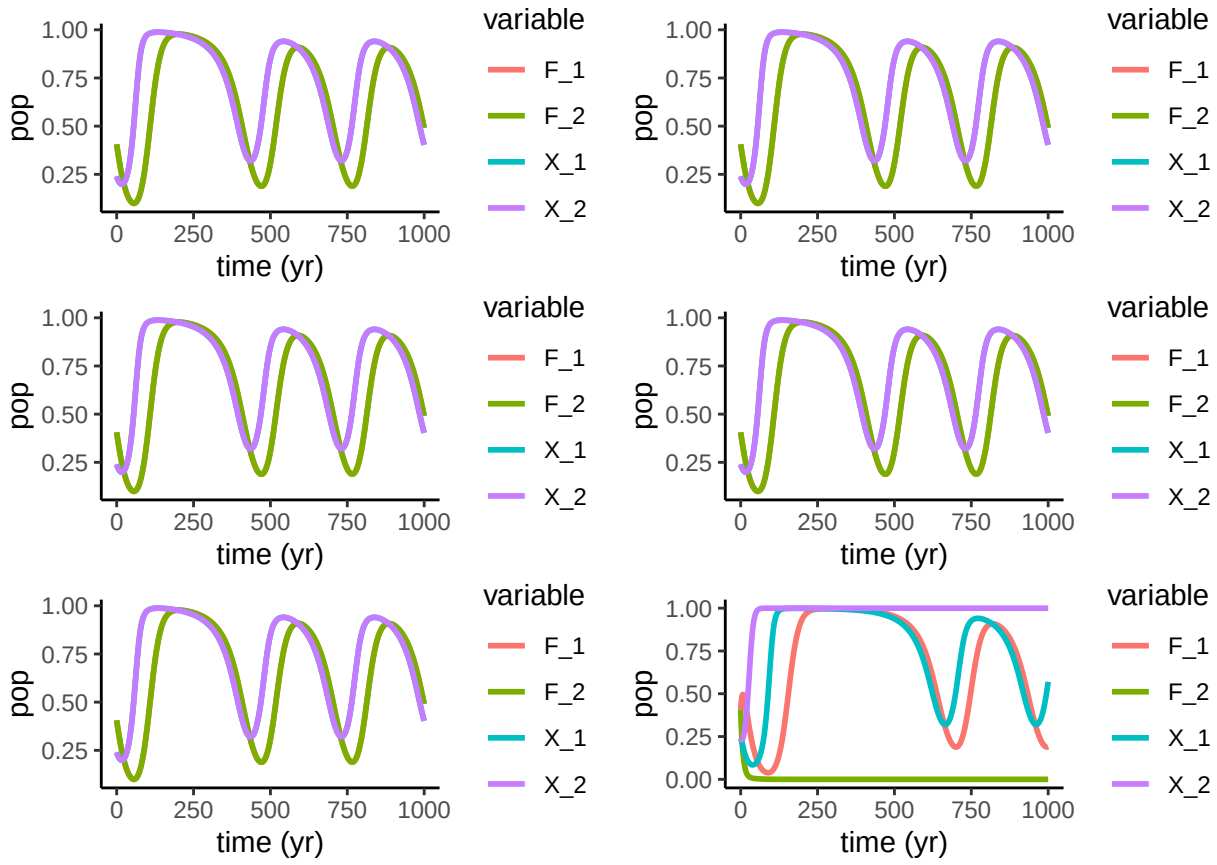
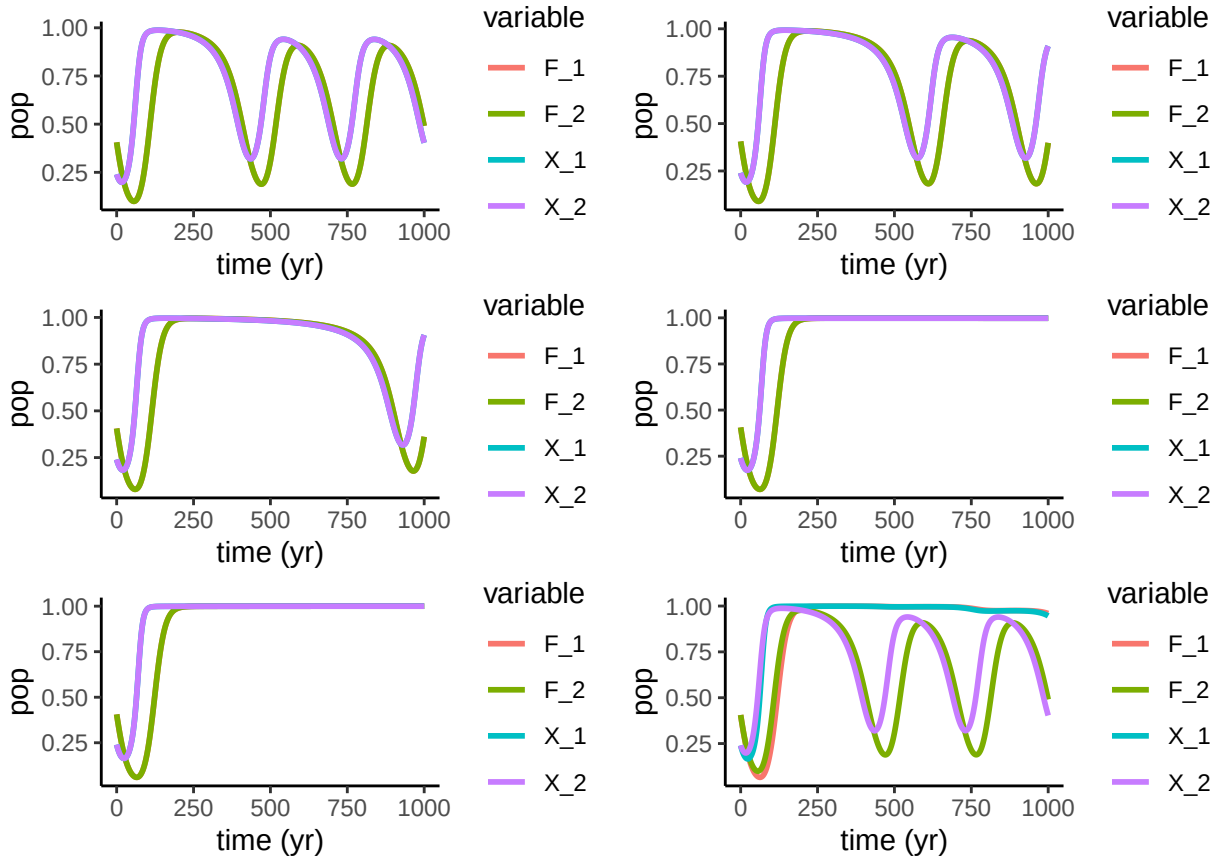


Figure 9: i - fish immigration

Makes sense because they're both increasing



Issue mentioned earlier where listening to outside sources tanks system

Figure 10: rho - Population influence on the other

```
## DLSODA-  Warning..Internal T (=R1) and H (=R2) are
##       such that in the machine, T + H = T on the next step
##      (H = step size). Solver will continue anyway.
## In above message, R1 = 398.569, R2 = 2.65876e-14
##
## DLSODA-  Warning..Internal T (=R1) and H (=R2) are
##       such that in the machine, T + H = T on the next step
##      (H = step size). Solver will continue anyway.
## In above message, R1 = 398.569, R2 = 2.65876e-14
##
## DLSODA-  Warning..Internal T (=R1) and H (=R2) are
##       such that in the machine, T + H = T on the next step
##      (H = step size). Solver will continue anyway.
## In above message, R1 = 398.569, R2 = 2.20235e-14
##
## DLSODA-  Warning..Internal T (=R1) and H (=R2) are
##       such that in the machine, T + H = T on the next step
##      (H = step size). Solver will continue anyway.
## In above message, R1 = 398.569, R2 = 2.20235e-14
##
## DLSODA-  Warning..Internal T (=R1) and H (=R2) are
##       such that in the machine, T + H = T on the next step
##      (H = step size). Solver will continue anyway.
## In above message, R1 = 398.569, R2 = 2.20235e-14
```

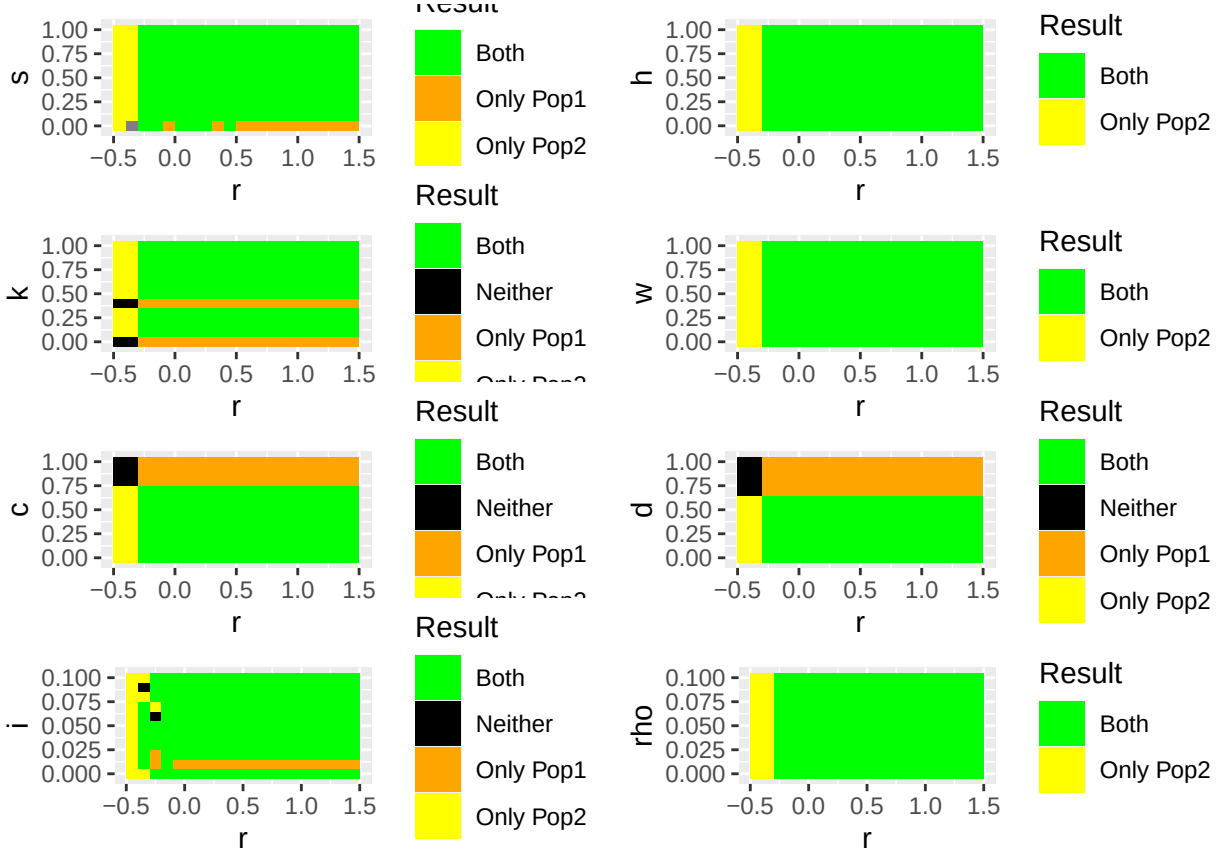


Figure 11: R parameter planes

i generally seems to have more interesting planes

```
##      (H = step size). Solver will continue anyway.
## In above message, R1 = 404.097, R2 = 1.41264e-14
##
## DLSODA-  Warning..Internal T (=R1) and H (=R2) are
##       such that in the machine, T + H = T on the next step
##      (H = step size). Solver will continue anyway.
## In above message, R1 = 404.097, R2 = 1.41264e-14
##
## DLSODA-  Above warning has been issued I1 times.
##      It will not be issued again for this problem.
## In above message, I1 = 10
##
## DLSODA-  At current T (=R1), MXSTEP (=I1) steps
##       taken on this call before reaching TOUT
## In above message, I1 = 5000
##
## In above message, R1 = 404.097
##
```

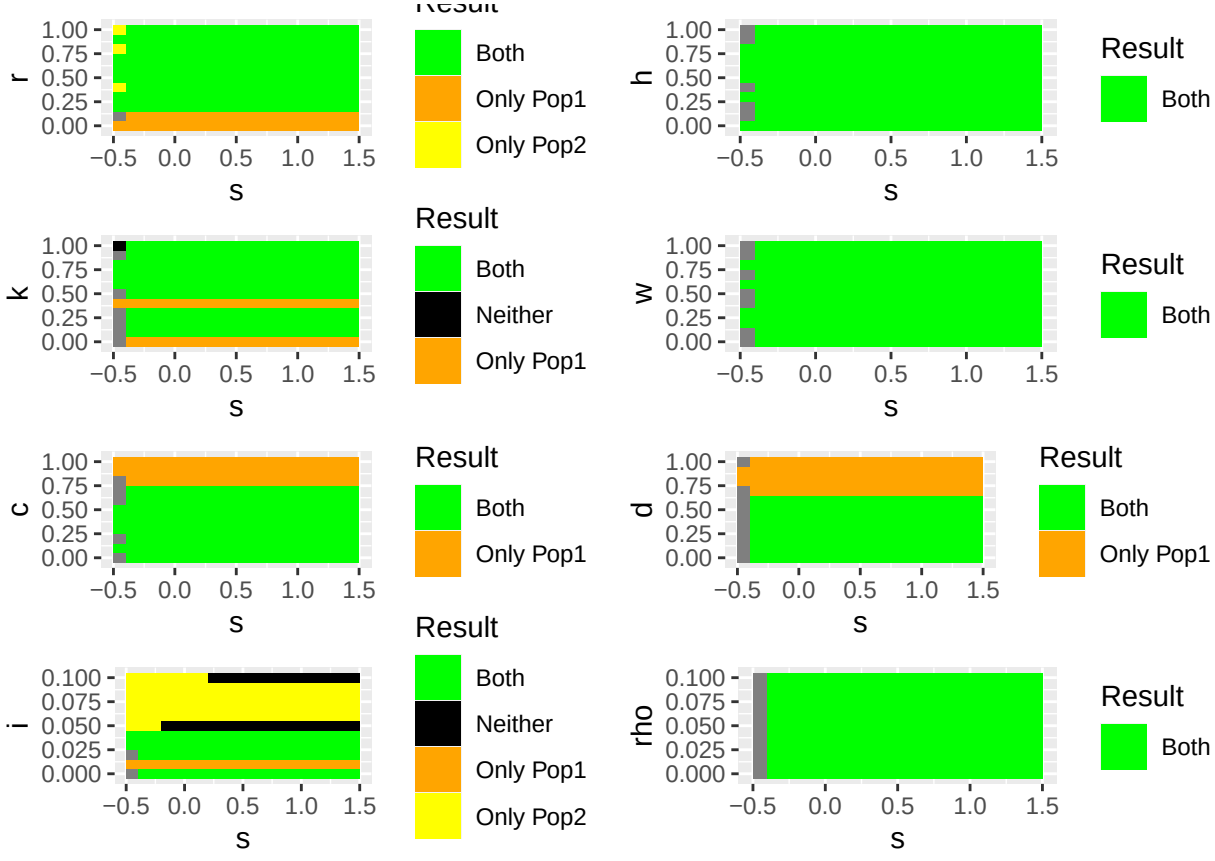


Figure 12: S parameter planes

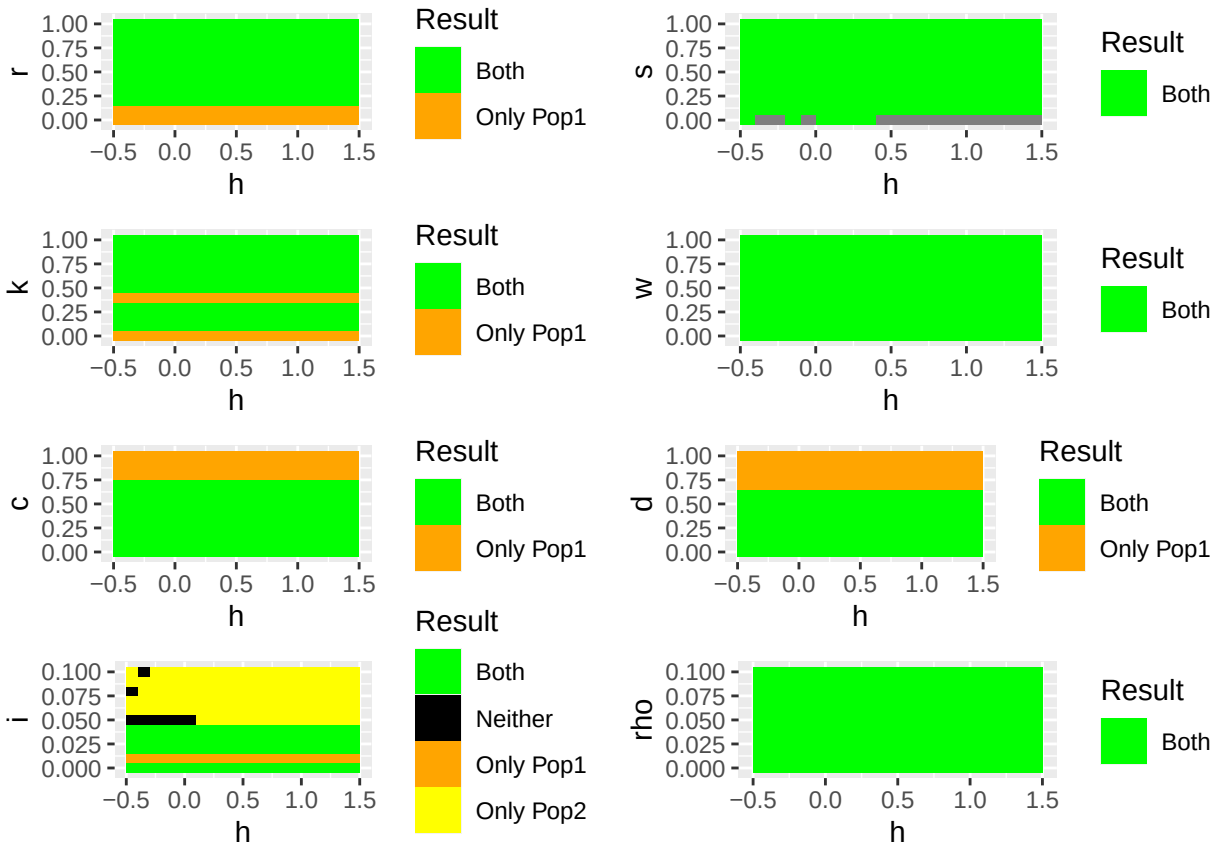


Figure 13: h parameter planes

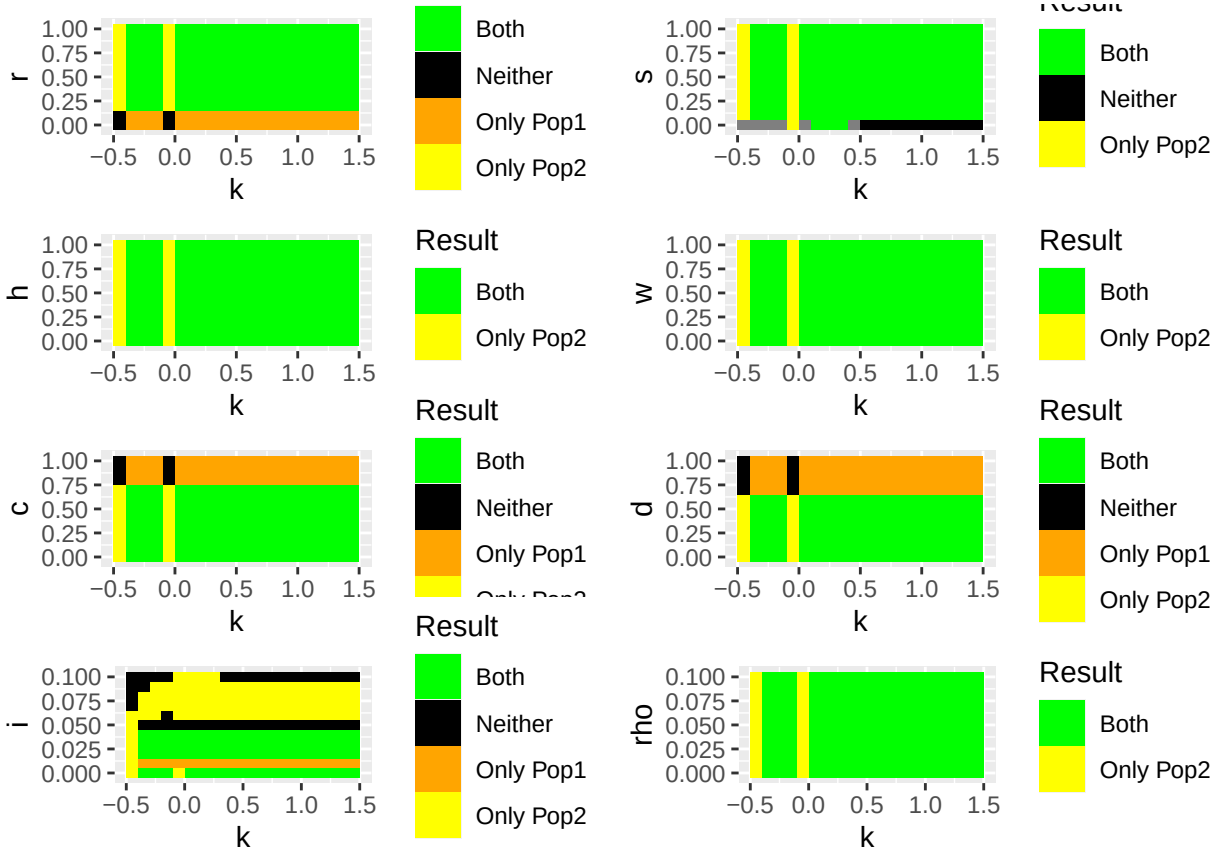


Figure 14: K parameter planes ranging from 0-1

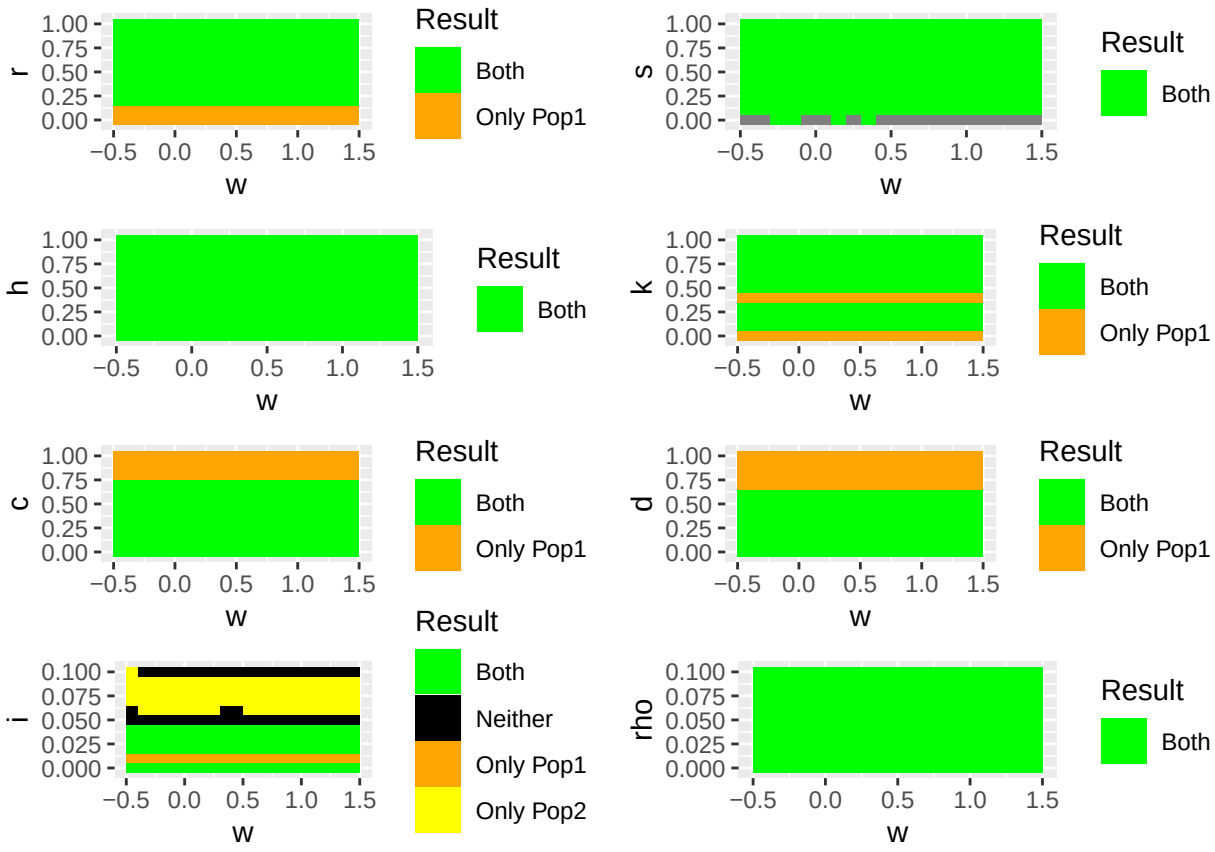


Figure 15: w parameter planes

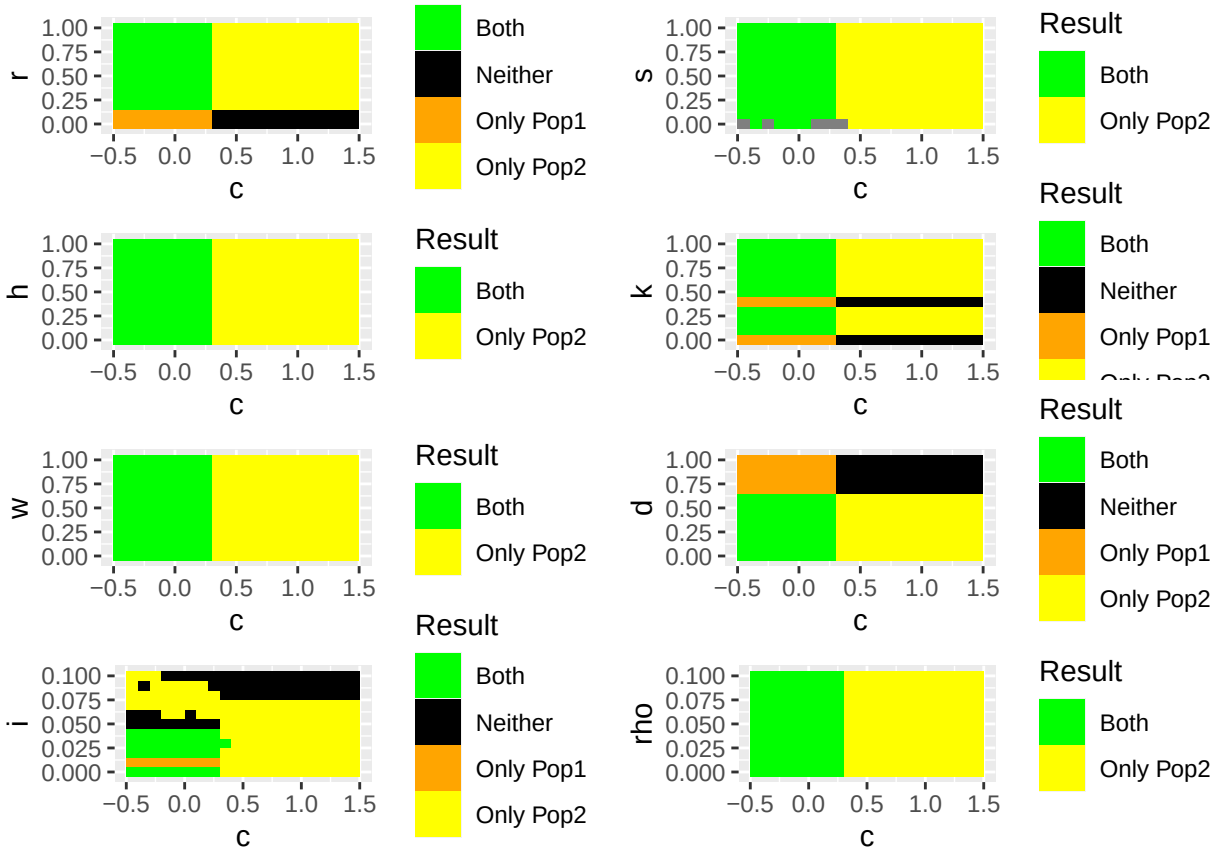


Figure 16: c parameter planes

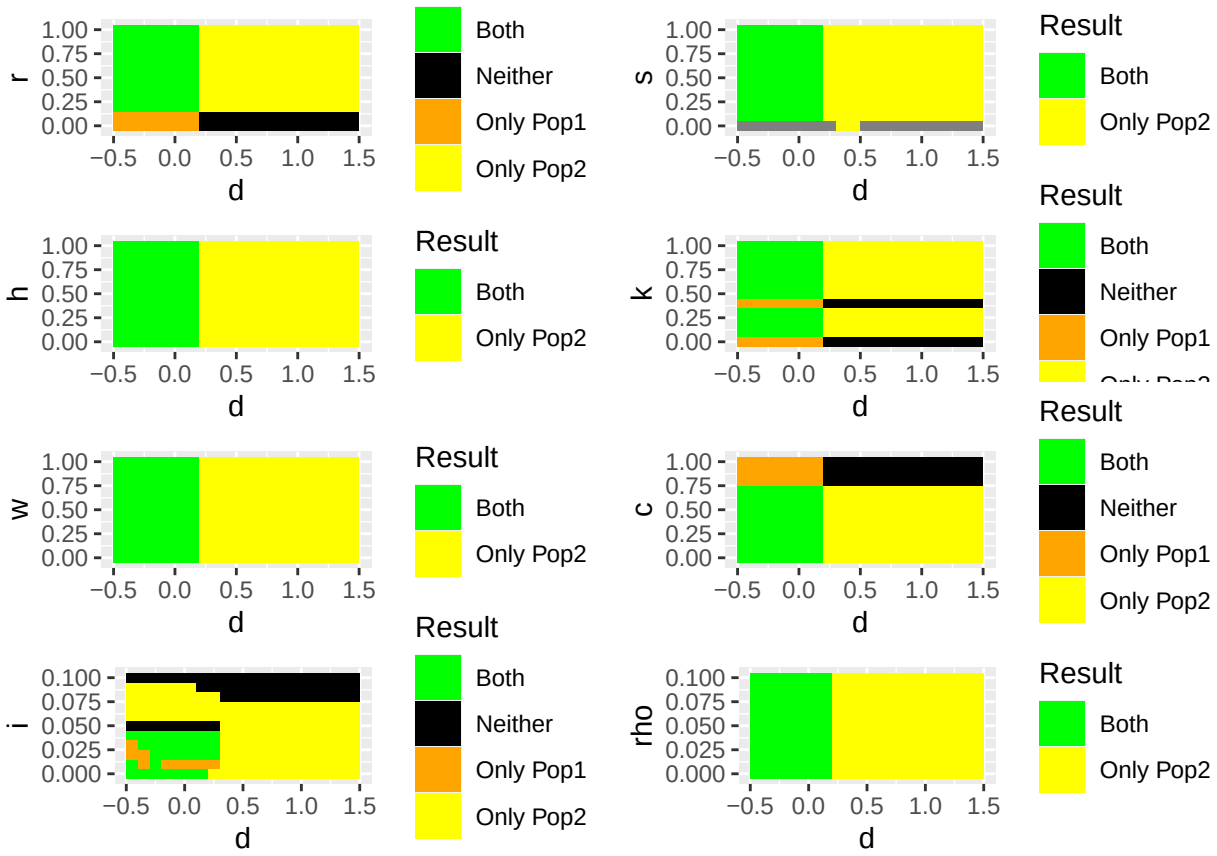


Figure 17: d parameter planes

```
## In above message, R1 = 614.224, R2 = 1.78279e-15
##
## DLSODA-  Above warning has been issued I1 times.
##      It will not be issued again for this problem.
## In above message, I1 = 10
##
## DLSODA-  At T (=R1) and step size H (=R2), the
##       corrector convergence failed repeatedly
##       or with ABS(H) = HMIN
## In above message, R1 = 986.917, R2 = 7.62939e-10
##
```

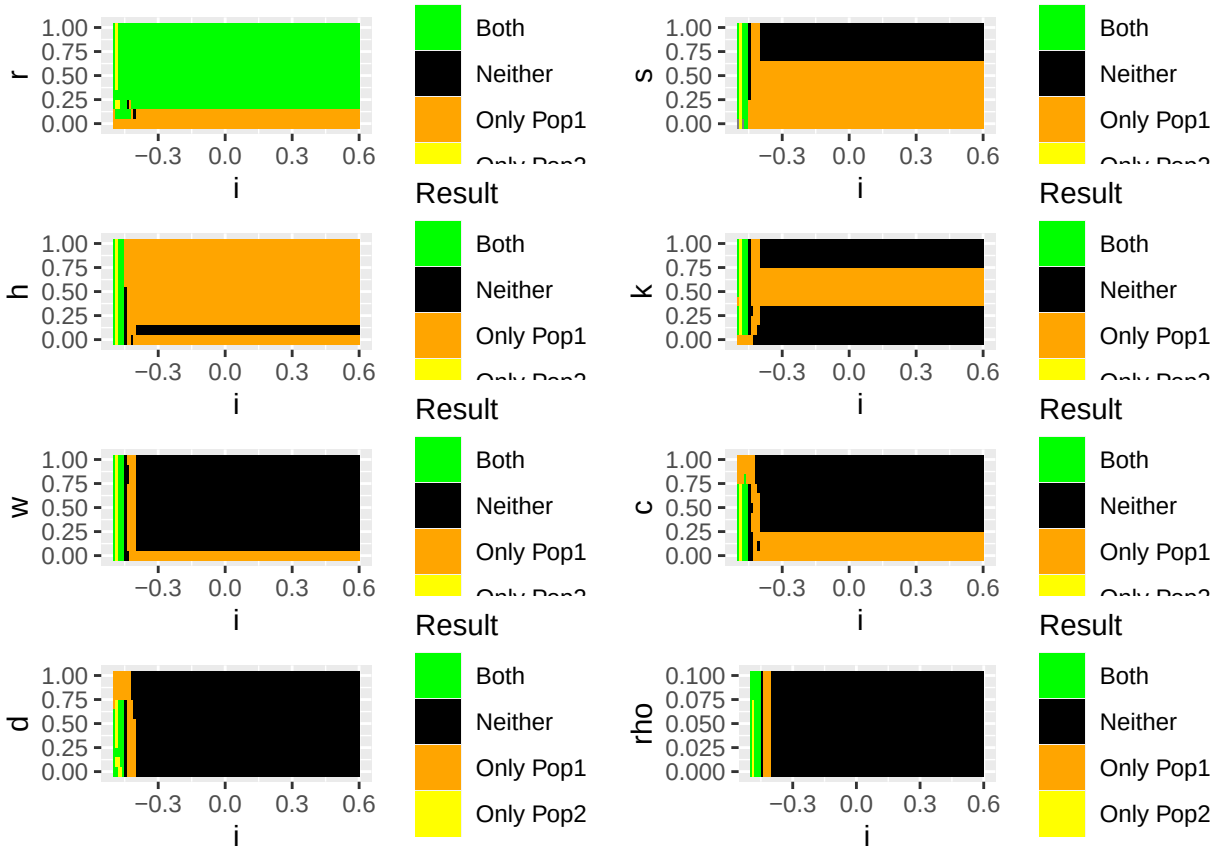


Figure 18: i parameter planes

```
## In above message, R1 = 404.097, R2 = 1.41264e-14
##
## DLSODA-  Above warning has been issued I1 times.
##      It will not be issued again for this problem.
## In above message, I1 = 10
##
## DLSODA-  At current T (=R1), MXSTEP (=I1) steps
##       taken on this call before reaching TOUT
## In above message, I1 = 5000
##
## In above message, R1 = 404.097
##
```

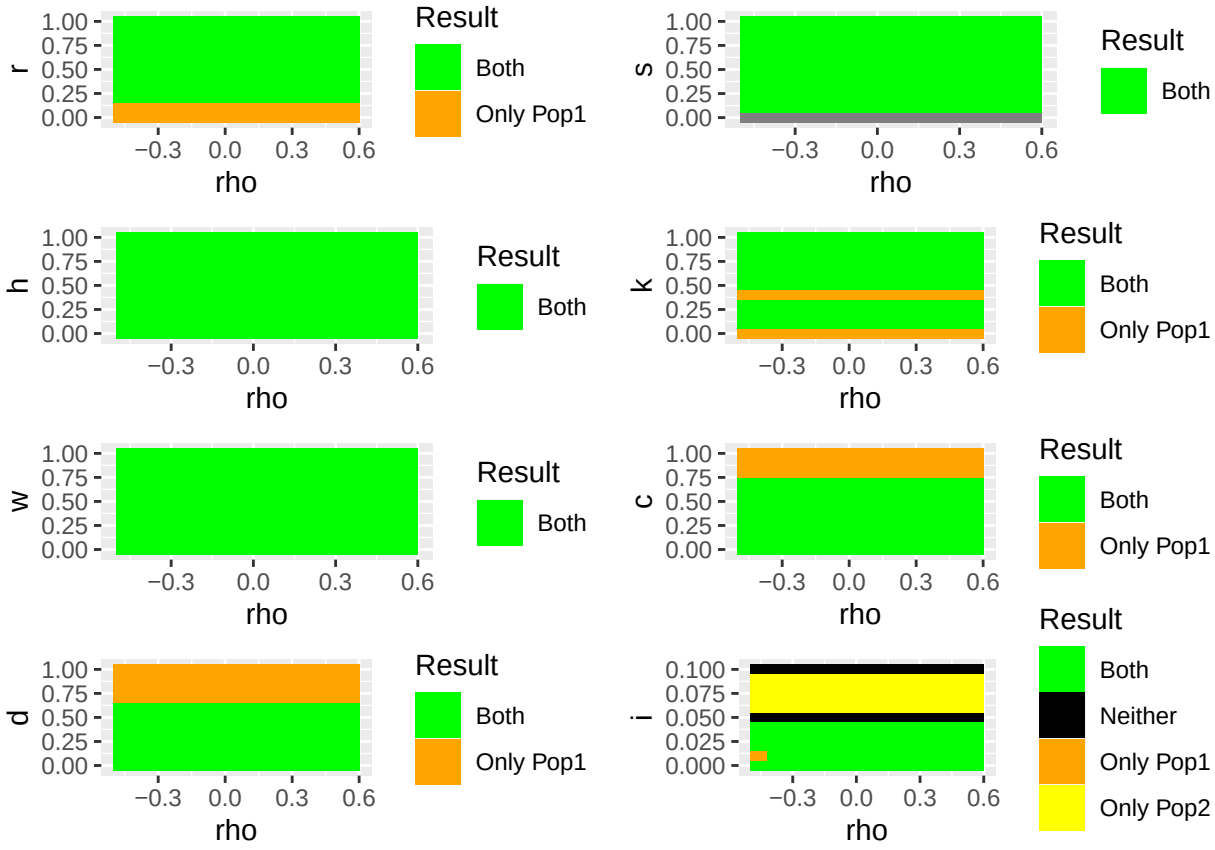


Figure 19: rho parameter planes

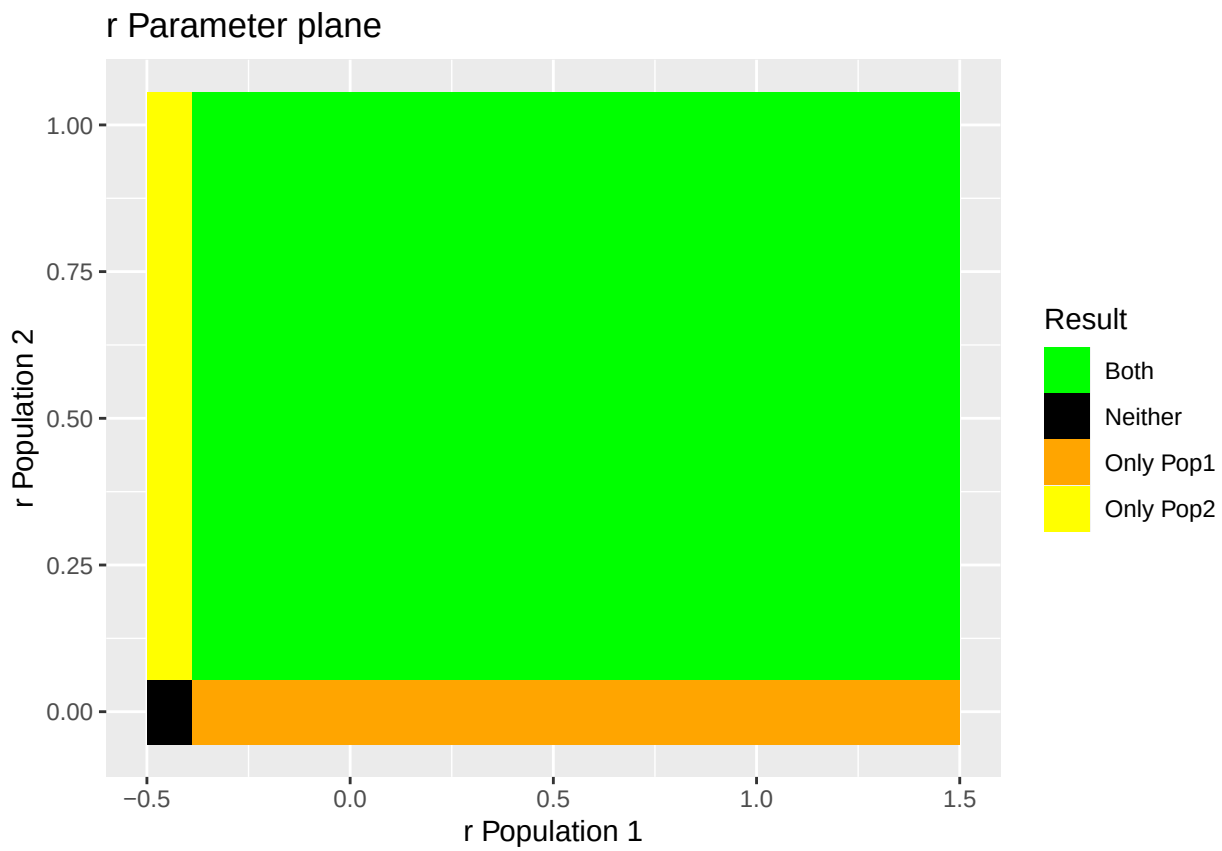


Figure 20: r population planes

```
## DLSODA-  Warning..Internal T (=R1) and H (=R2) are
##       such that in the machine, T + H = T on the next step
##      (H = step size). Solver will continue anyway.
## In above message, R1 = 396.592, R2 = 2.66468e-14
##
## DLSODA-  Warning..Internal T (=R1) and H (=R2) are
##       such that in the machine, T + H = T on the next step
##      (H = step size). Solver will continue anyway.
## In above message, R1 = 396.592, R2 = 2.66468e-14
##
## DLSODA-  Warning..Internal T (=R1) and H (=R2) are
##       such that in the machine, T + H = T on the next step
##      (H = step size). Solver will continue anyway.
## In above message, R1 = 396.592, R2 = 2.20725e-14
##
## DLSODA-  Warning..Internal T (=R1) and H (=R2) are
##       such that in the machine, T + H = T on the next step
##      (H = step size). Solver will continue anyway.
## In above message, R1 = 396.592, R2 = 2.20725e-14
##
## DLSODA-  Warning..Internal T (=R1) and H (=R2) are
##       such that in the machine, T + H = T on the next step
##      (H = step size). Solver will continue anyway.
```

##

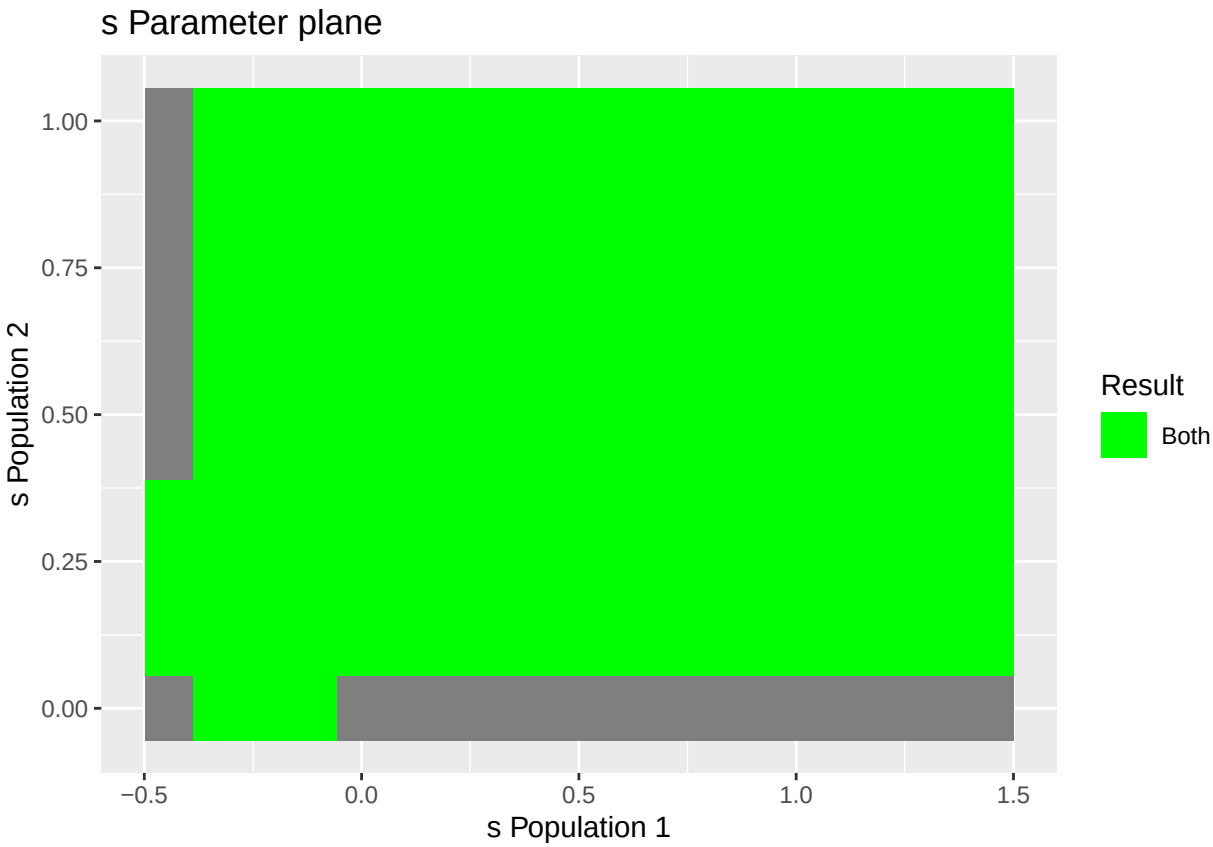


Figure 21: s population planes

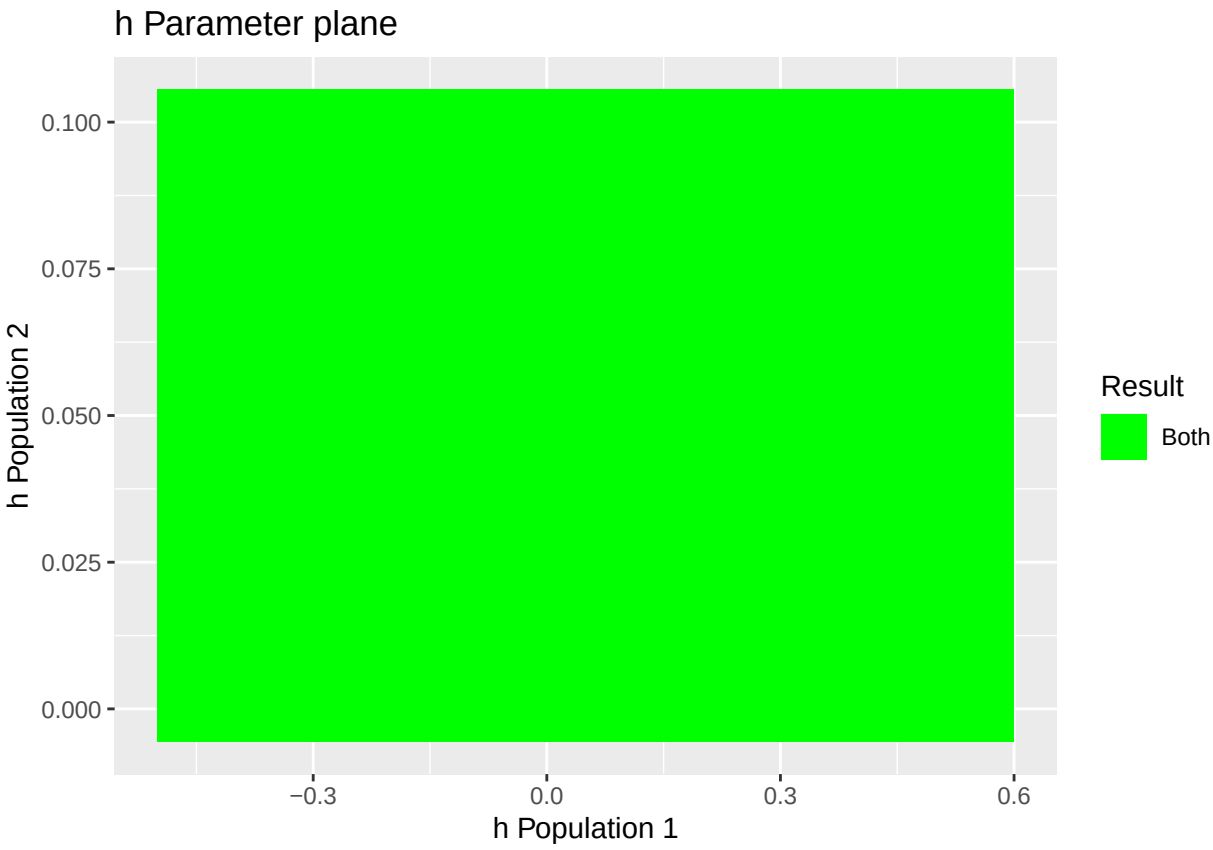


Figure 22: h population planes

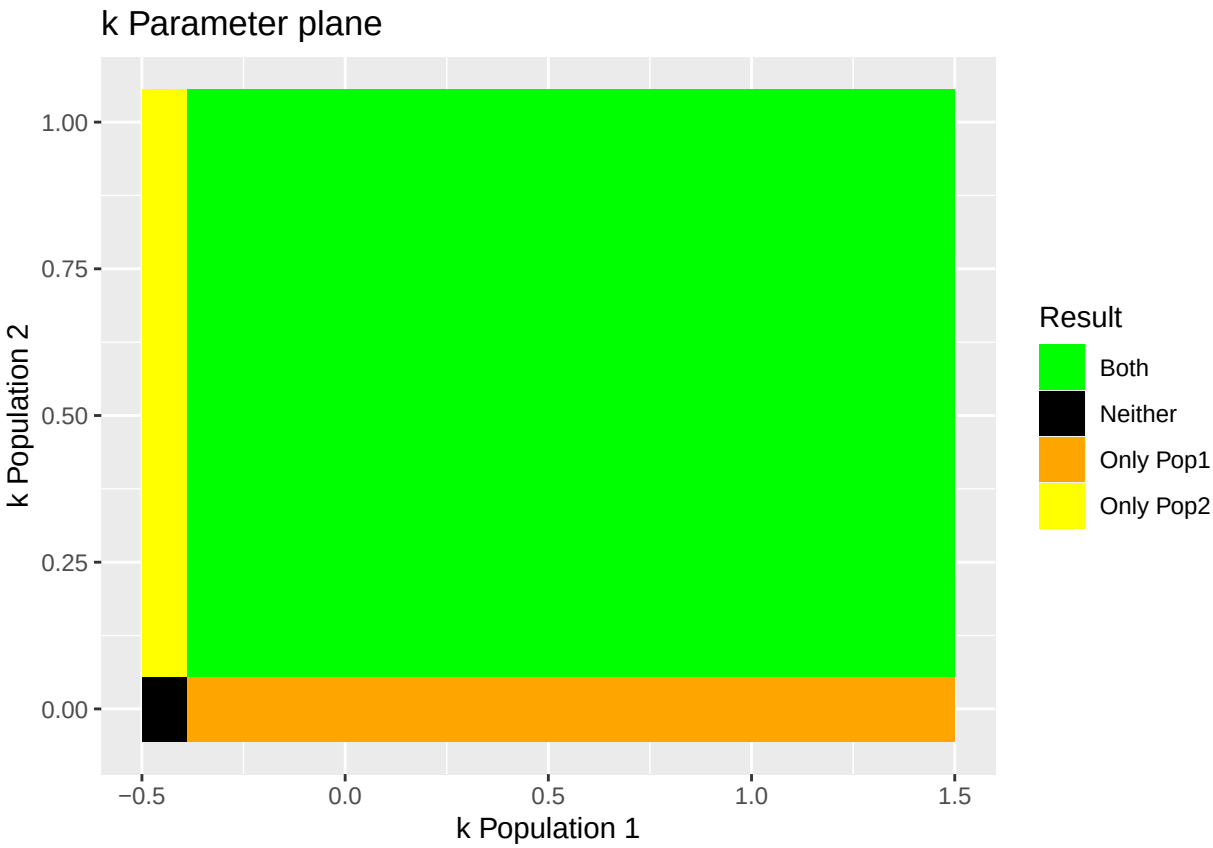


Figure 23: k population planes 0 to 1

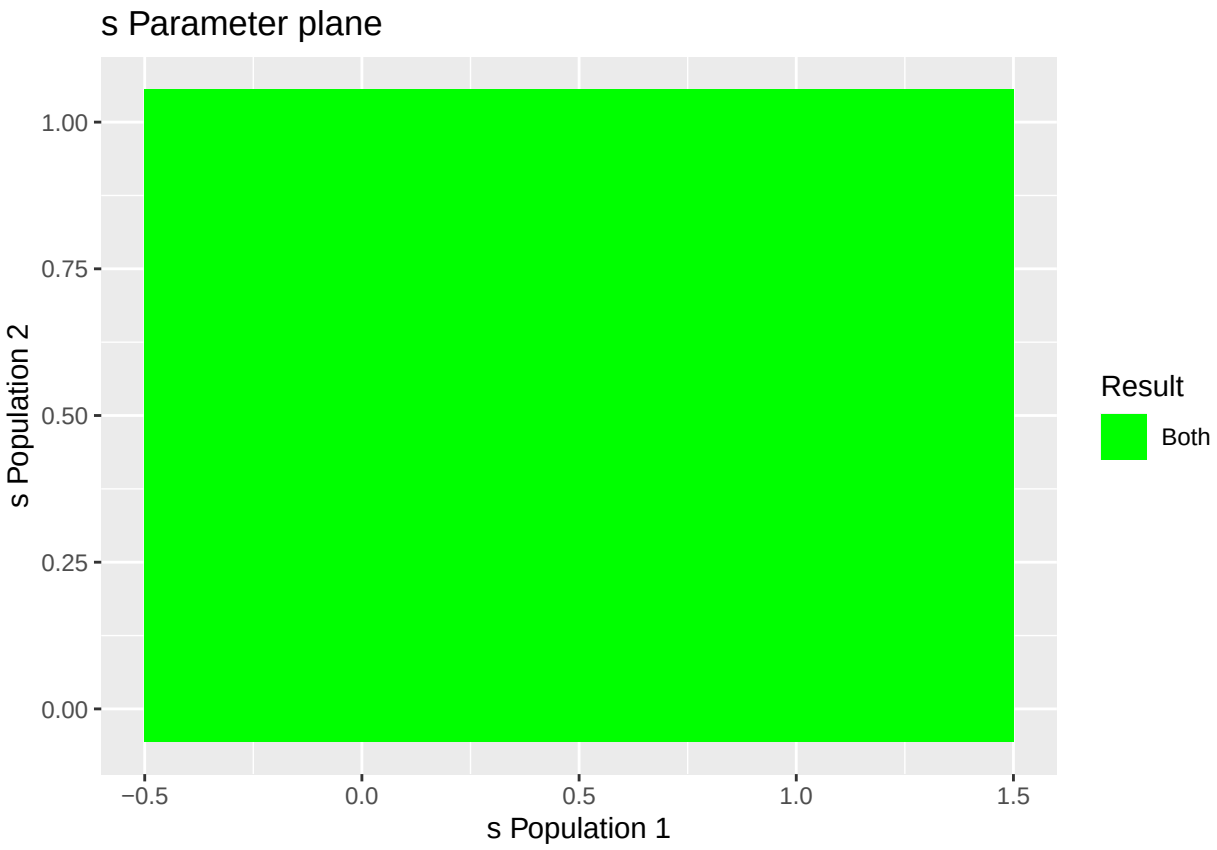


Figure 24: w population planes

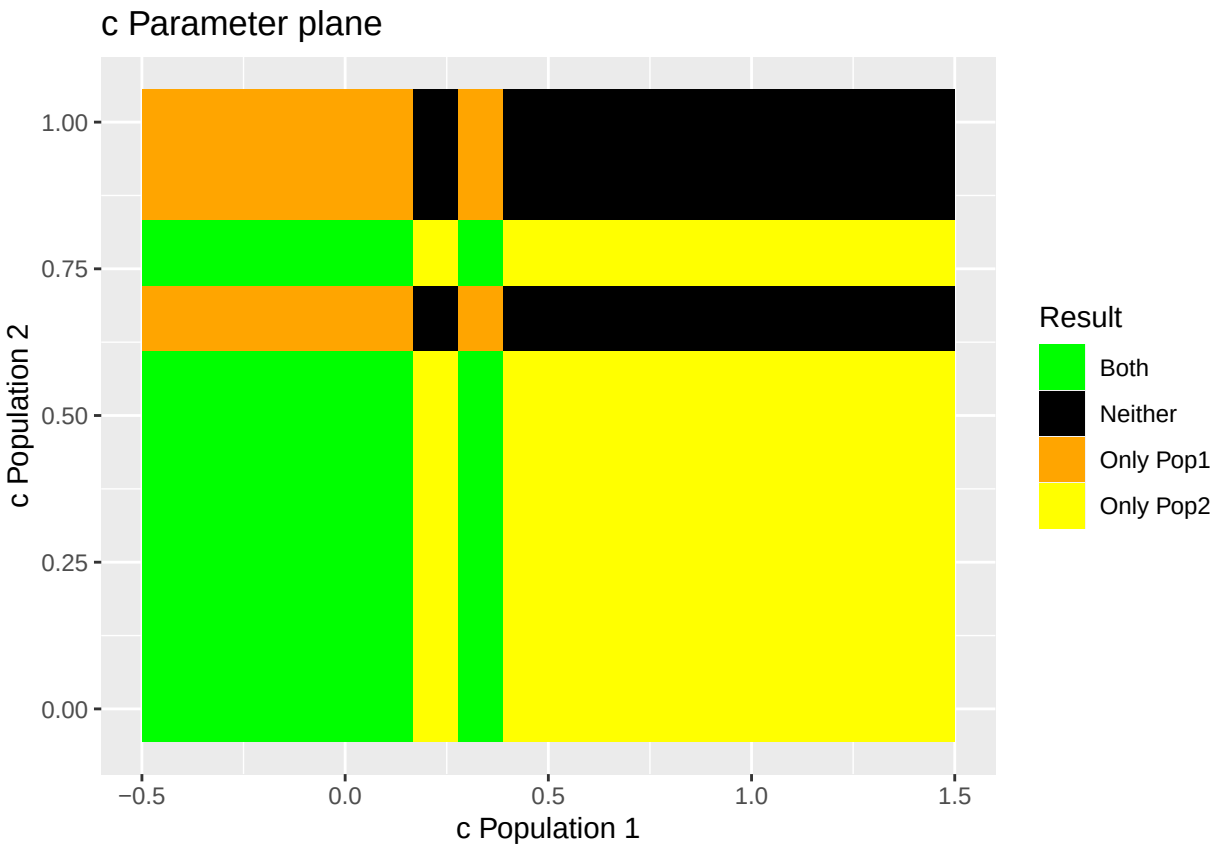


Figure 25: c population planes

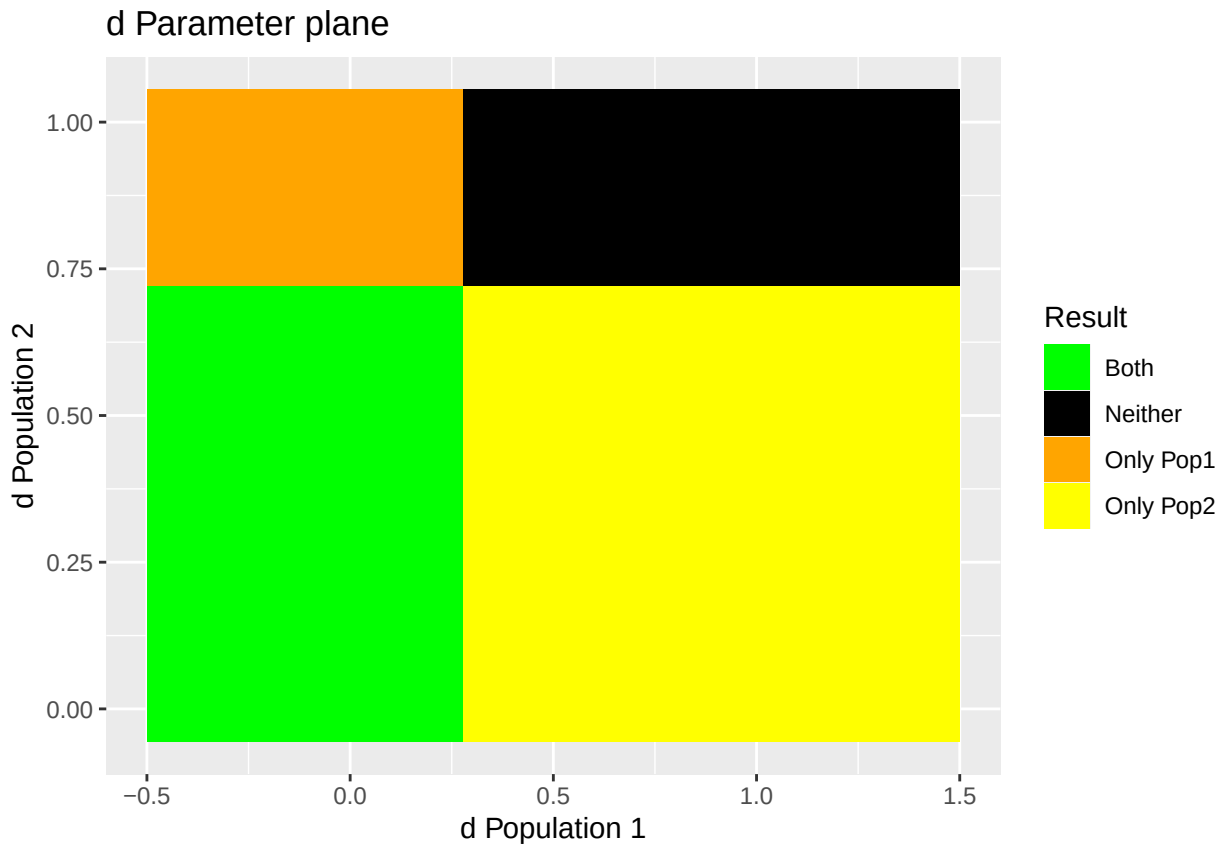


Figure 26: d population planes

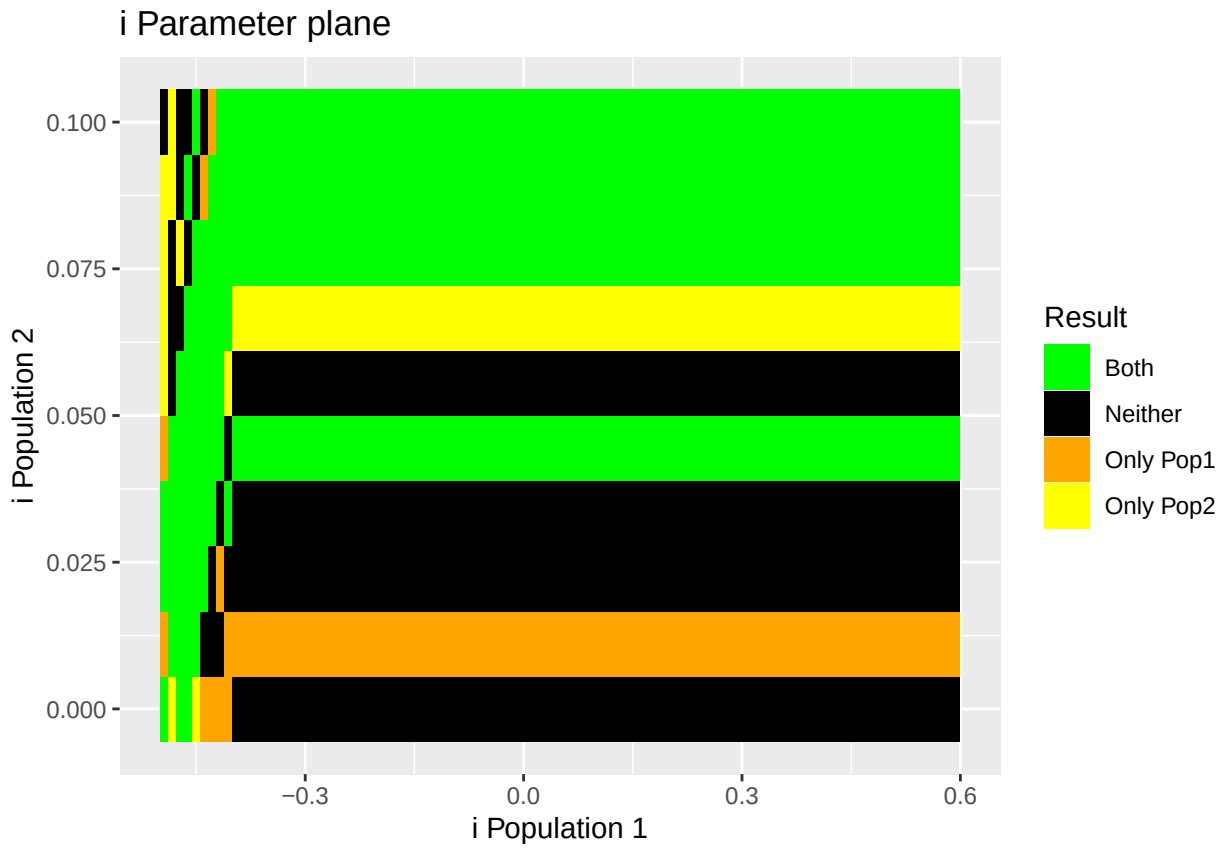


Figure 27: i population planes

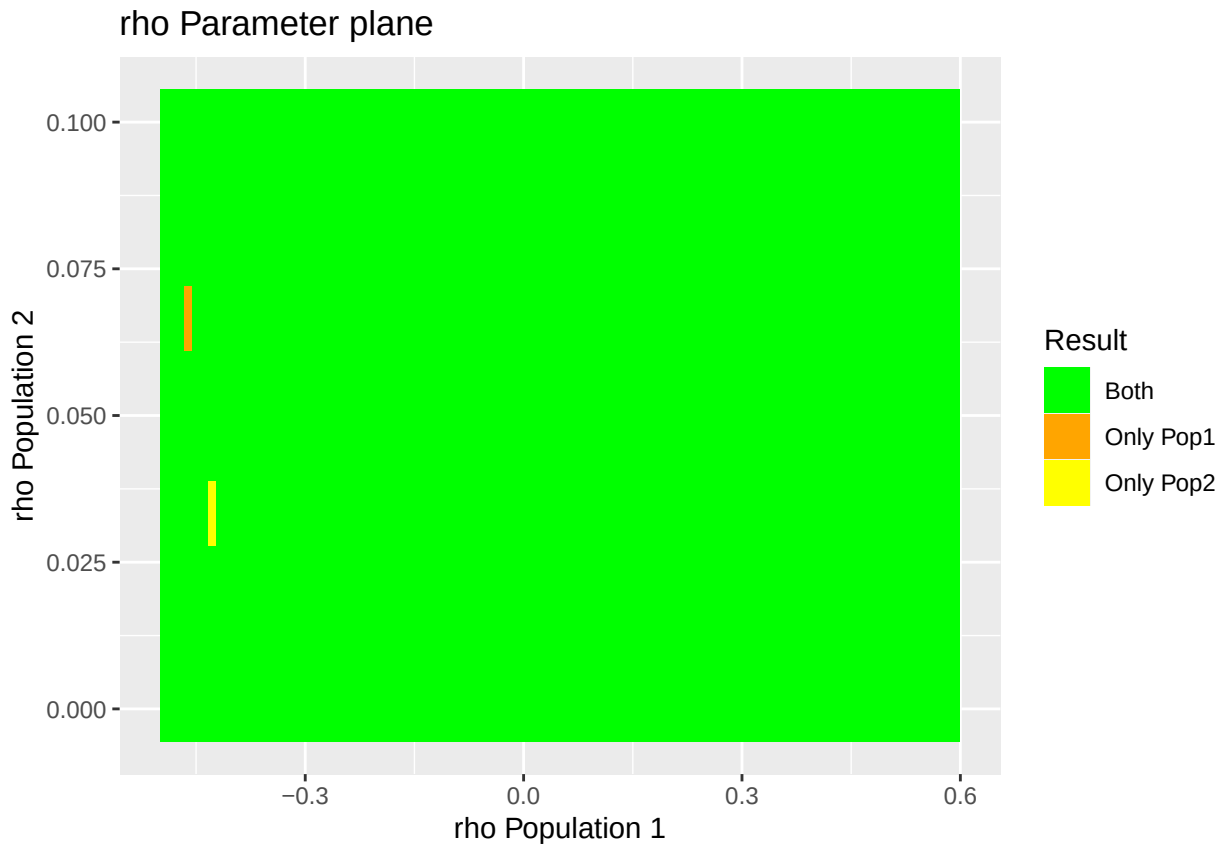


Figure 28: rho population planes

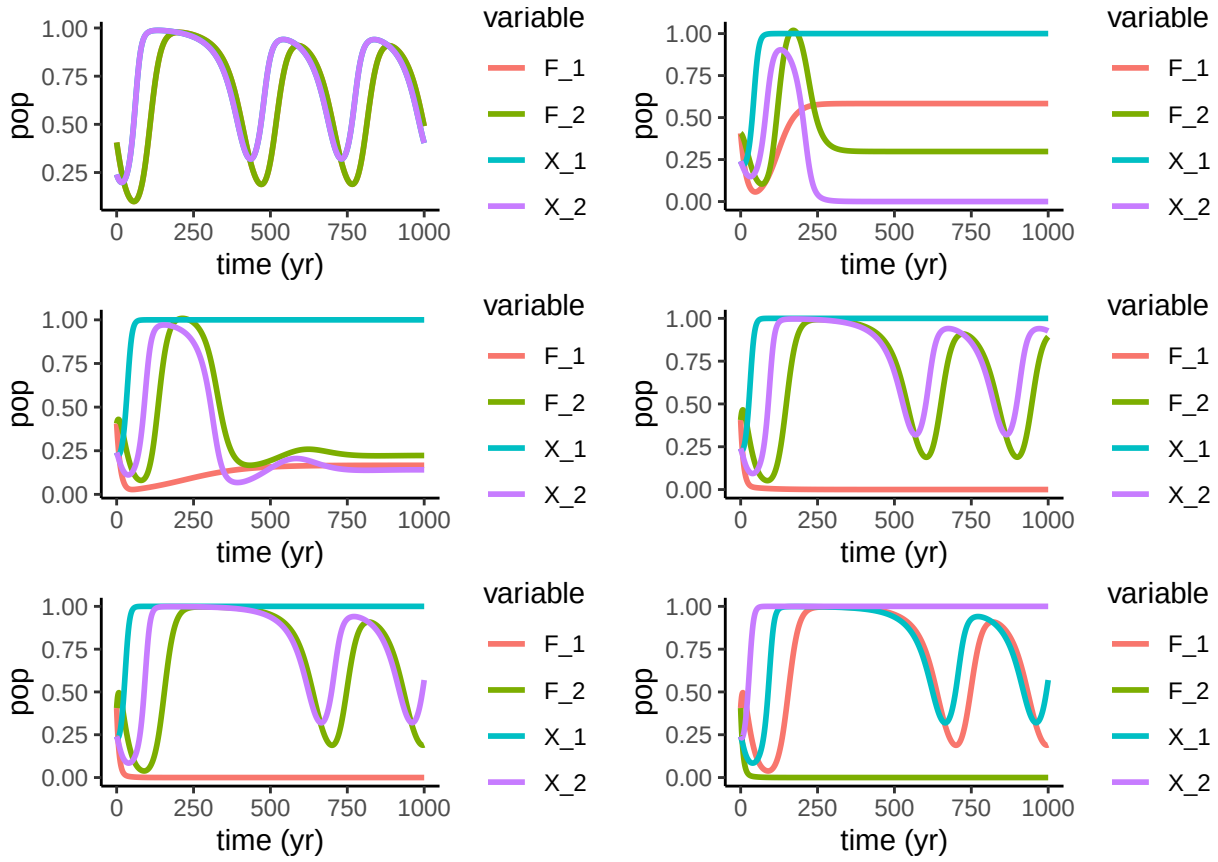


Figure 29: increasing only the i2 parameter

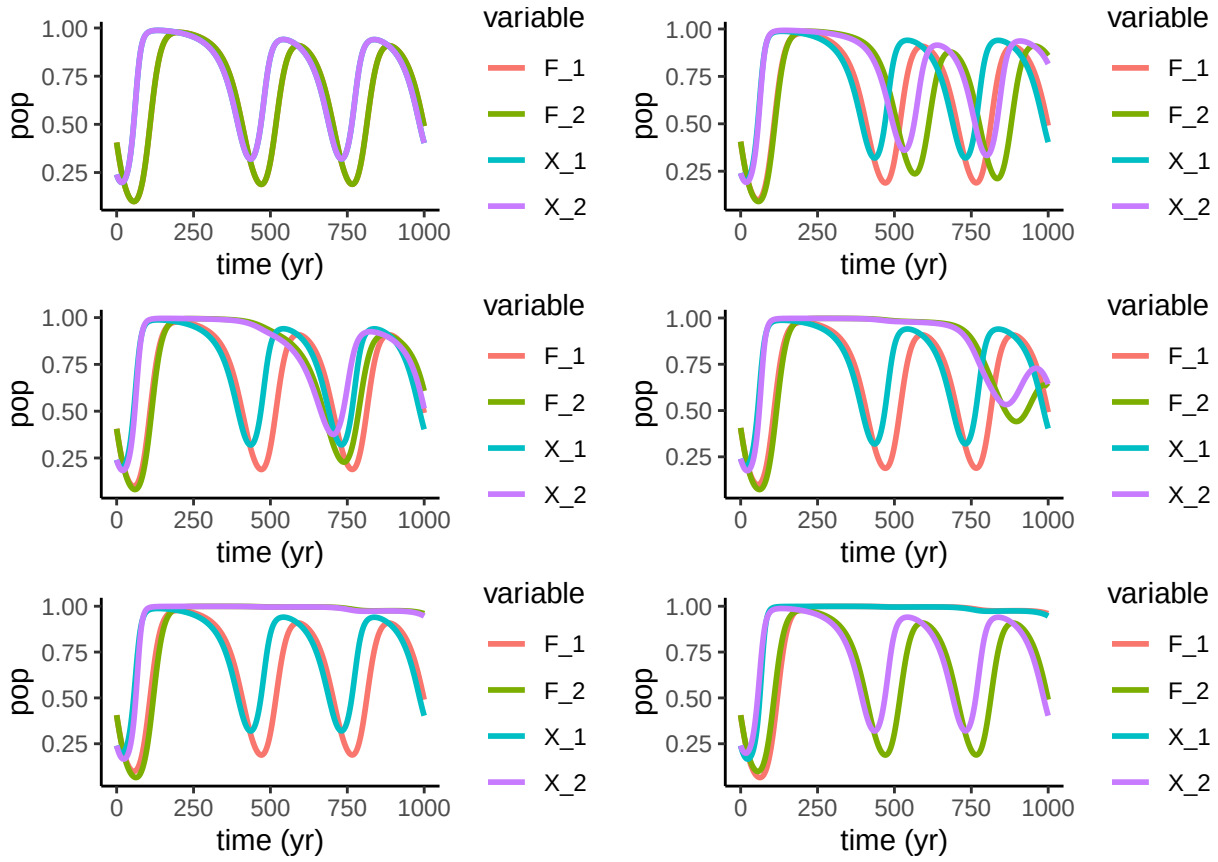


Figure 30: increasing only the rho2 parameter