BauchModel_DefaultParamsHighMovement

Sophie Wulfing

06 April, 2023, 18:30

Figure 1: Original Bauch Model

Table 1: Parameter values used in this analysis

Parameter	Population_1	Population_2	Def
r	0.07	0.07	Fish net growth
s	0.8	0.8	Supply and demand
h	0.1	0.1	Harvesting efficiency
k	1.014	1.014	Social learning rate
w	0.35	0.35	Conservation cost
c	1.5	1.5	Rarity valuation
d	0.5	0.5	Social norm strength (within pop)
e	0.2	0.07	Fish emigration (from patch)
i	0.07	0.2	Fish immigration (from opposite patch)
prop	0.1	0.5	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: DEFAULTS PARAMS HIGH MOVEMENT

Function:

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

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

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

$\frac{dX_2}{dt} = k_2 X_2 (1 - X_2)[\frac{1}{P_2 + c_2} - w_2 + d_2 (2X_2 - 1) + prop_2 (2X_1 - 1)]$
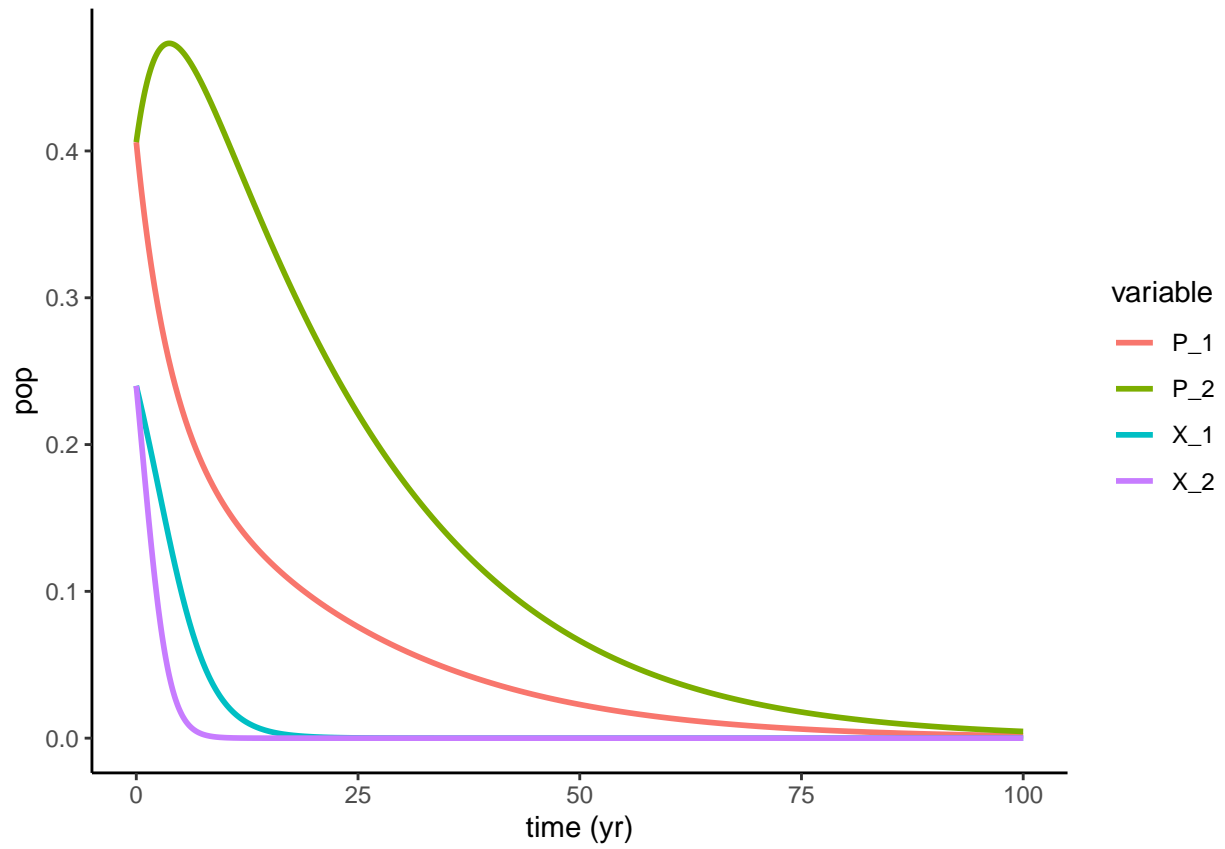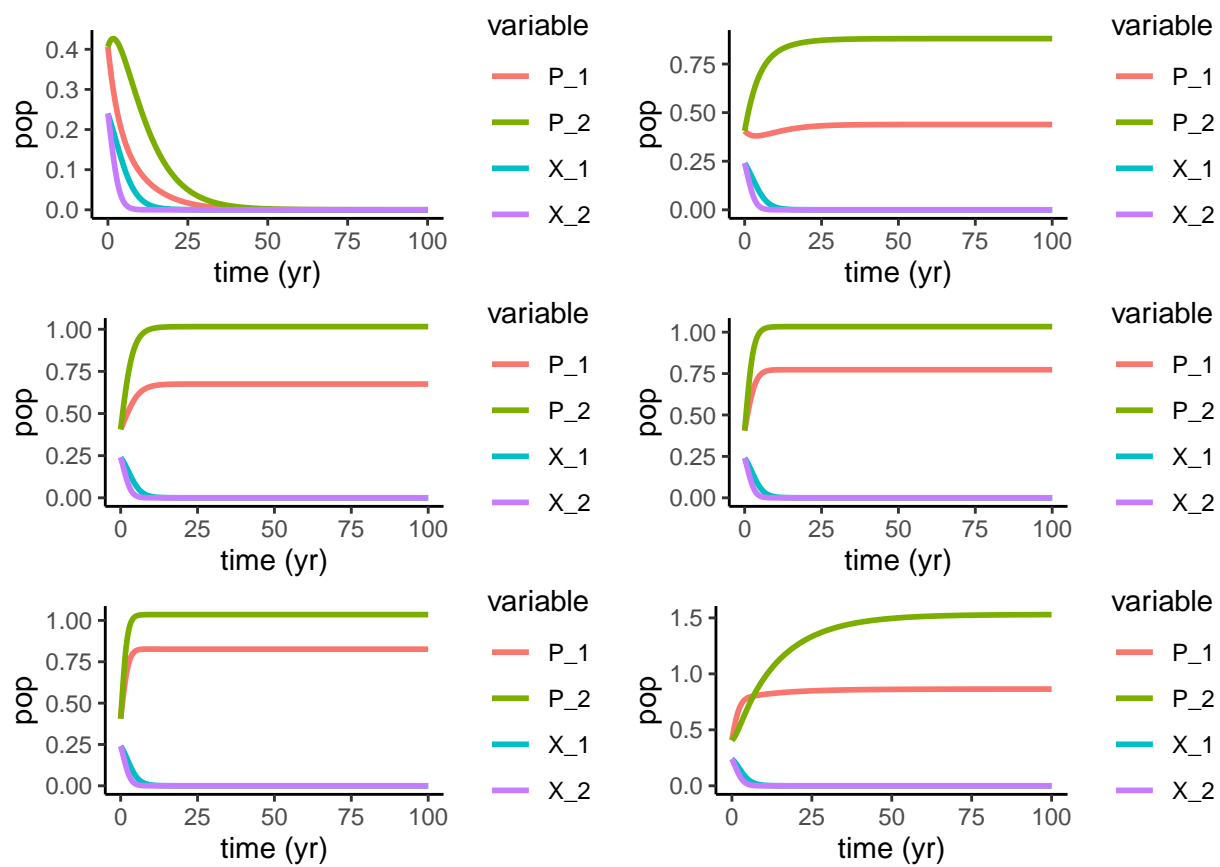
Figure 2: New Model with default paramters

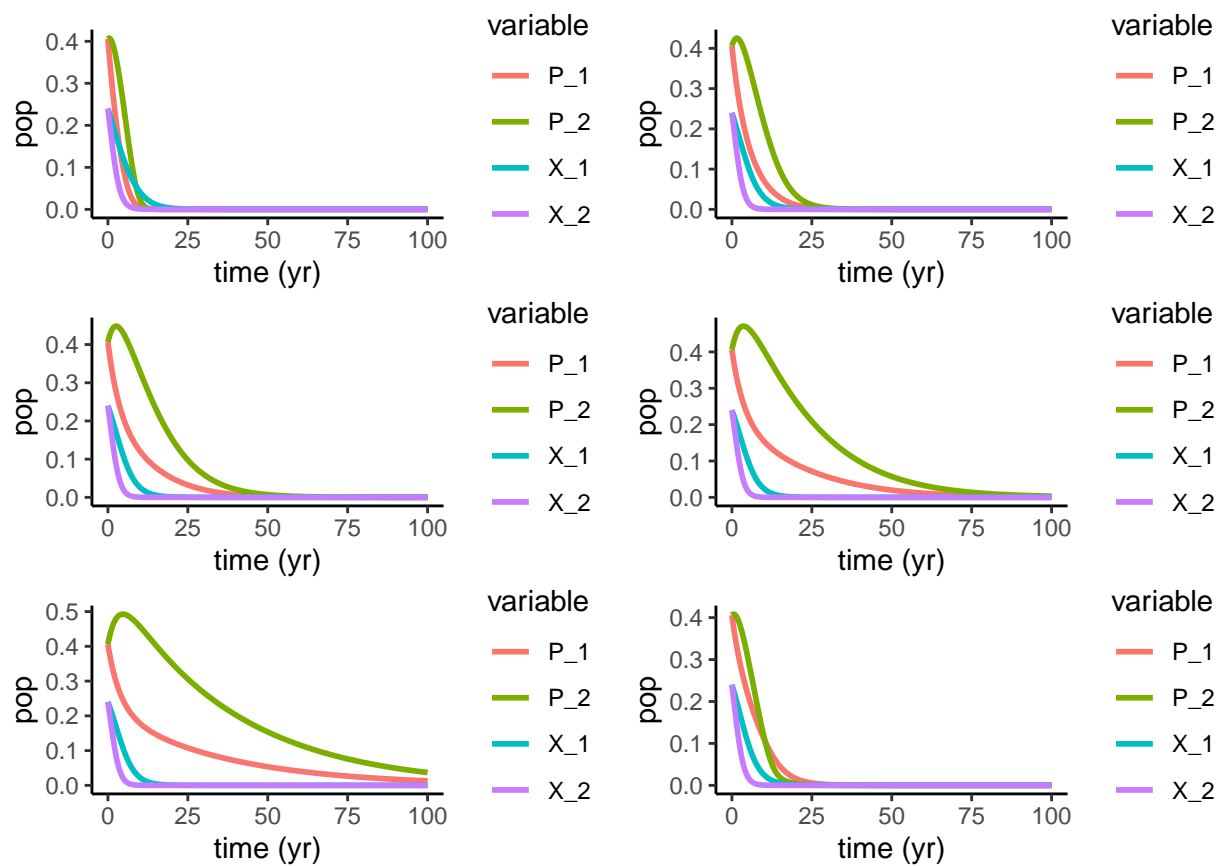Figure 3: R - Net growth/fecundity, range 0 to 1

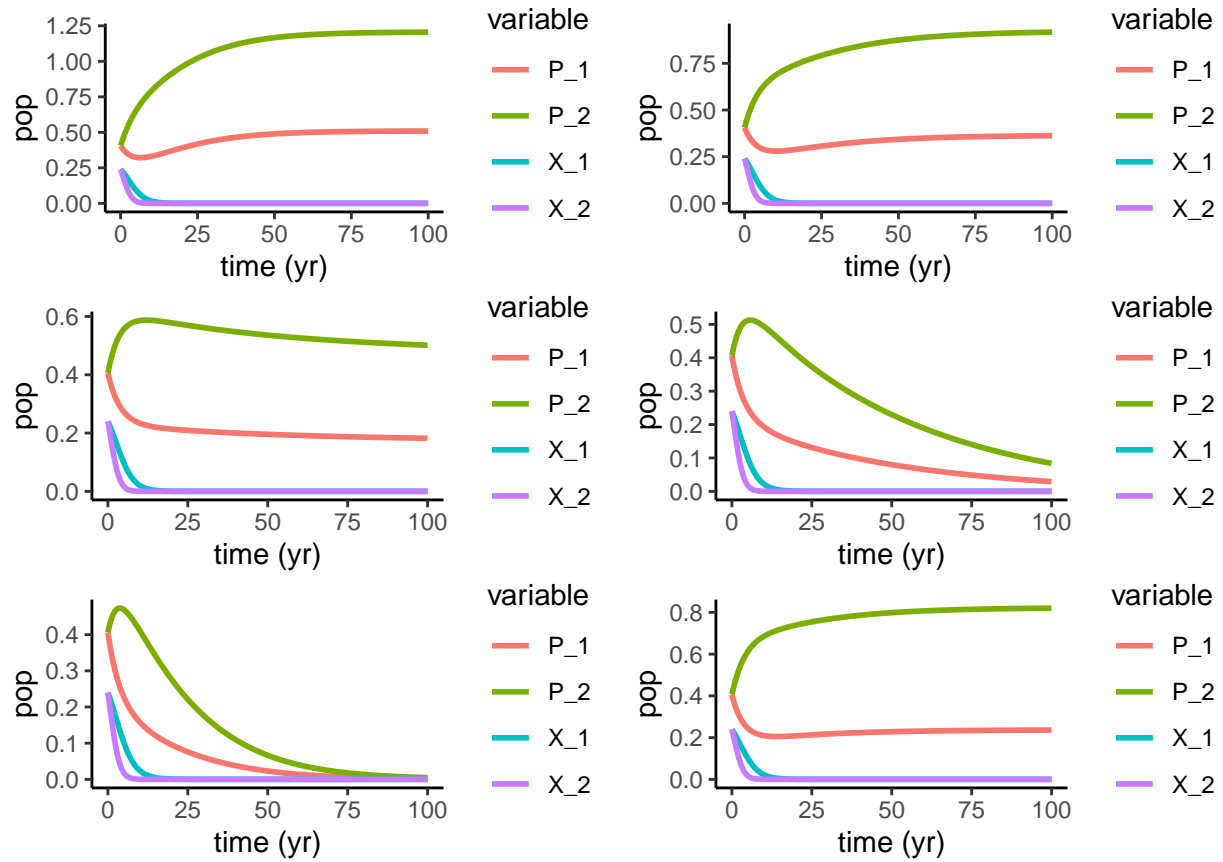Figure 4: S - supply and demand, range 0.1 to 1

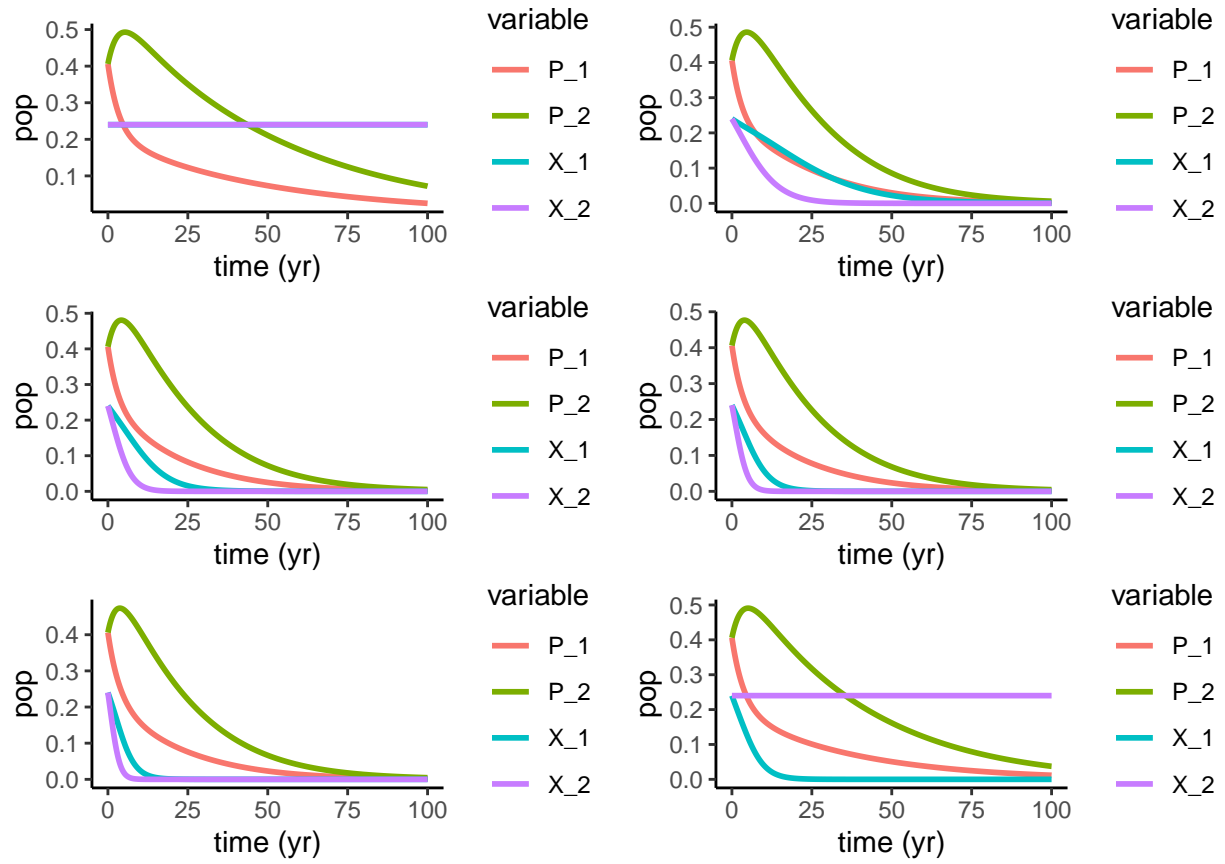Figure 5: h - Harvesting efficiency, range 0 to 0.1. Note, default is .075

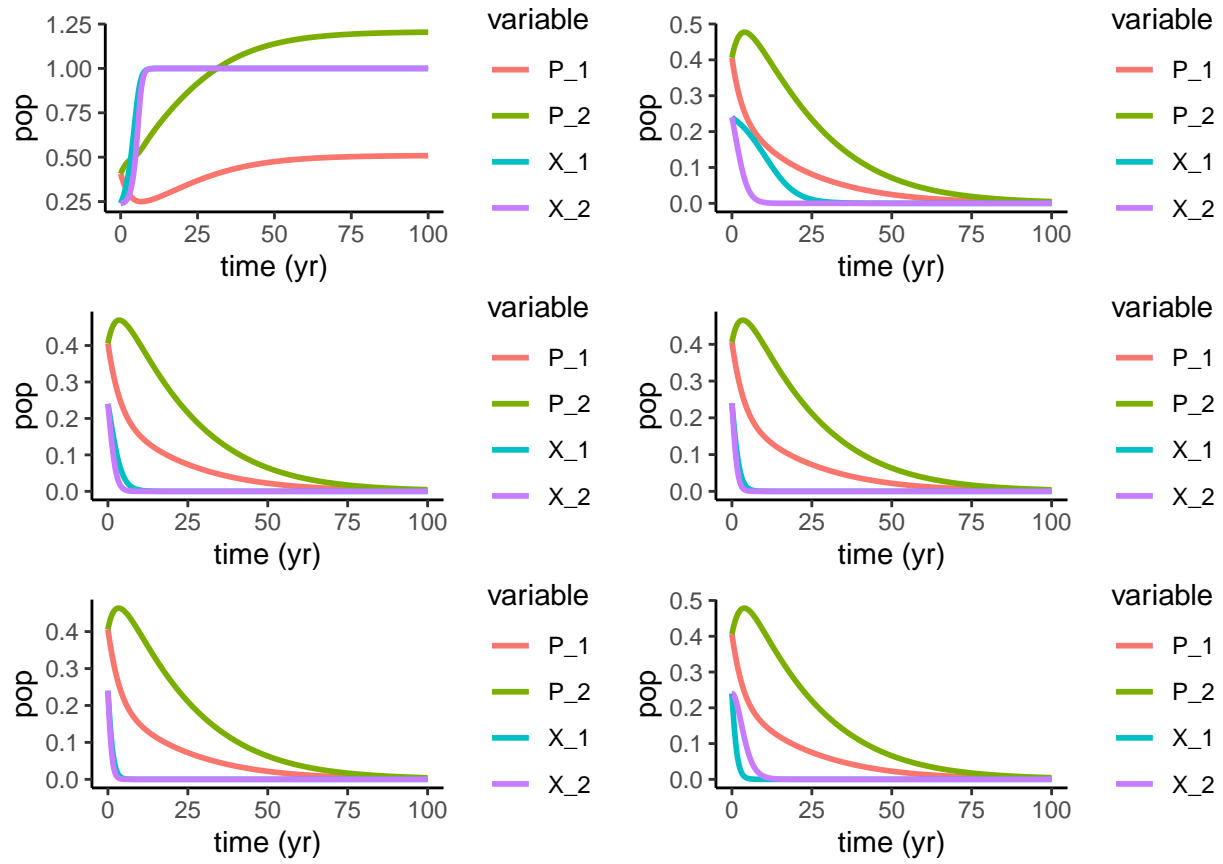Figure 6: K - Social learning rate 0 to 1
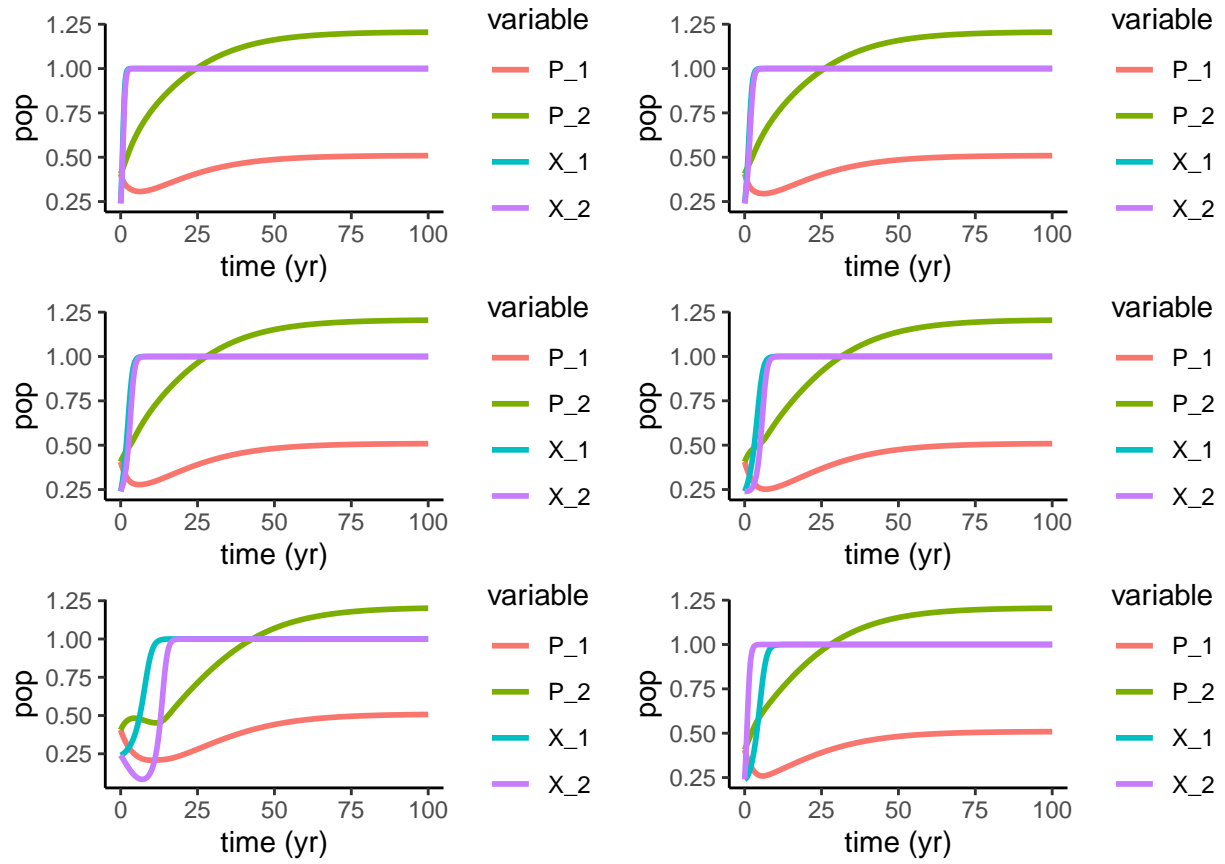
Figure 7: w - conservation costs
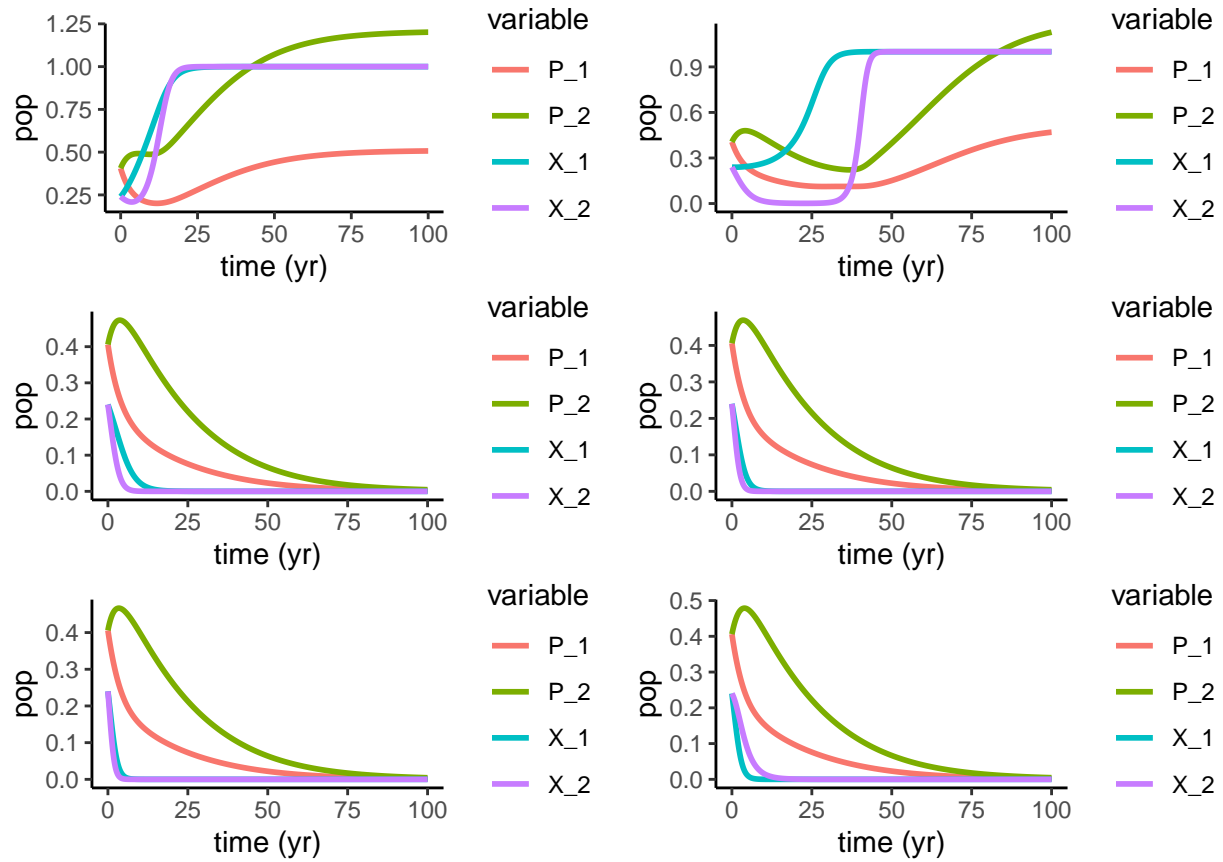
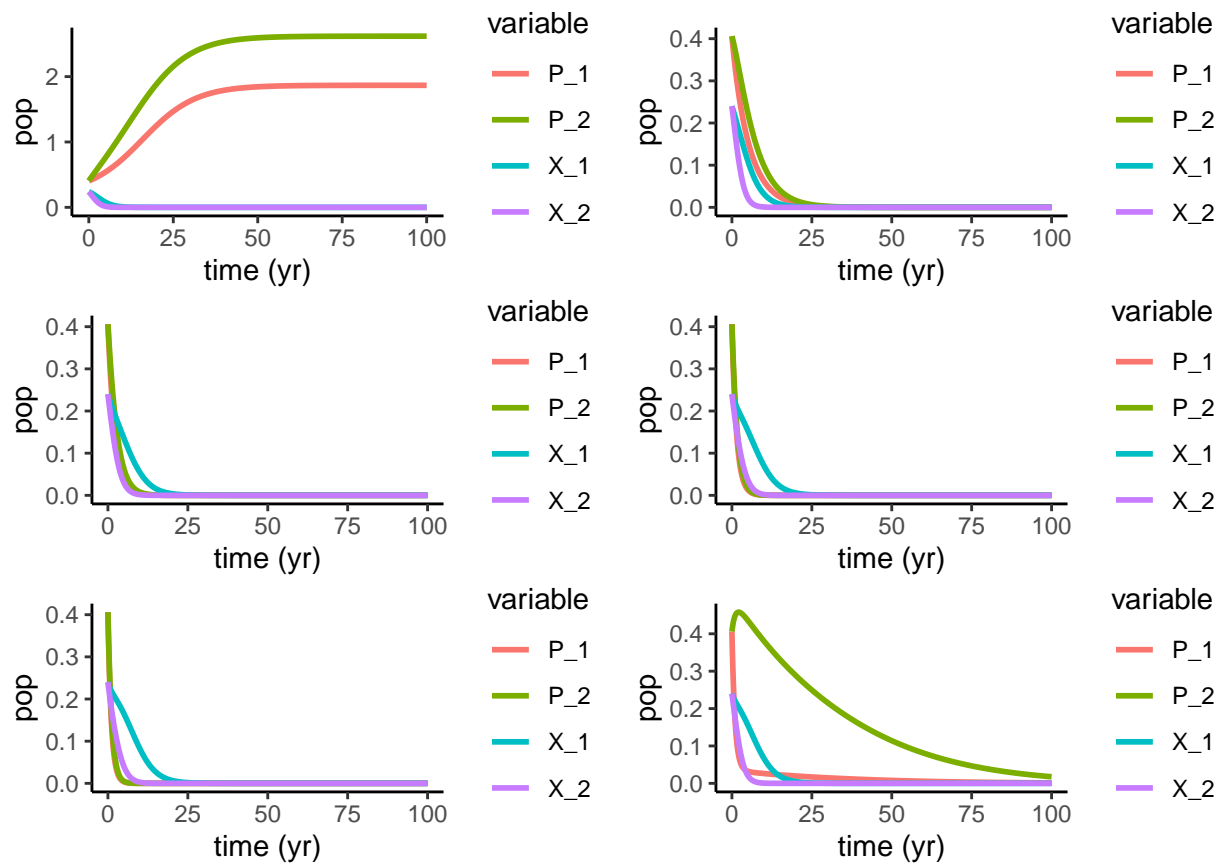Figure 8: c - rarity valuation param

Figure 9: d - social norm strength

Figure 10: e - fish emigration
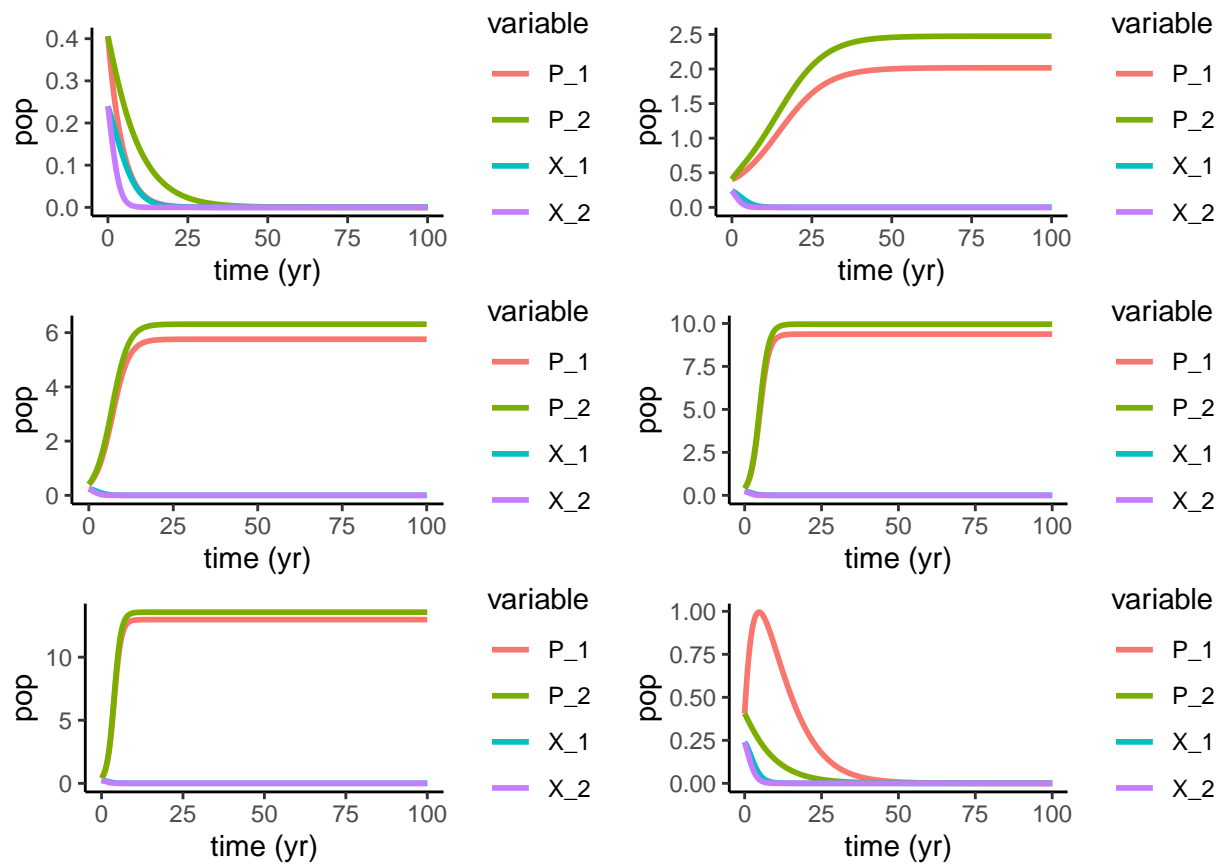
Figure 11: i - fish immigration
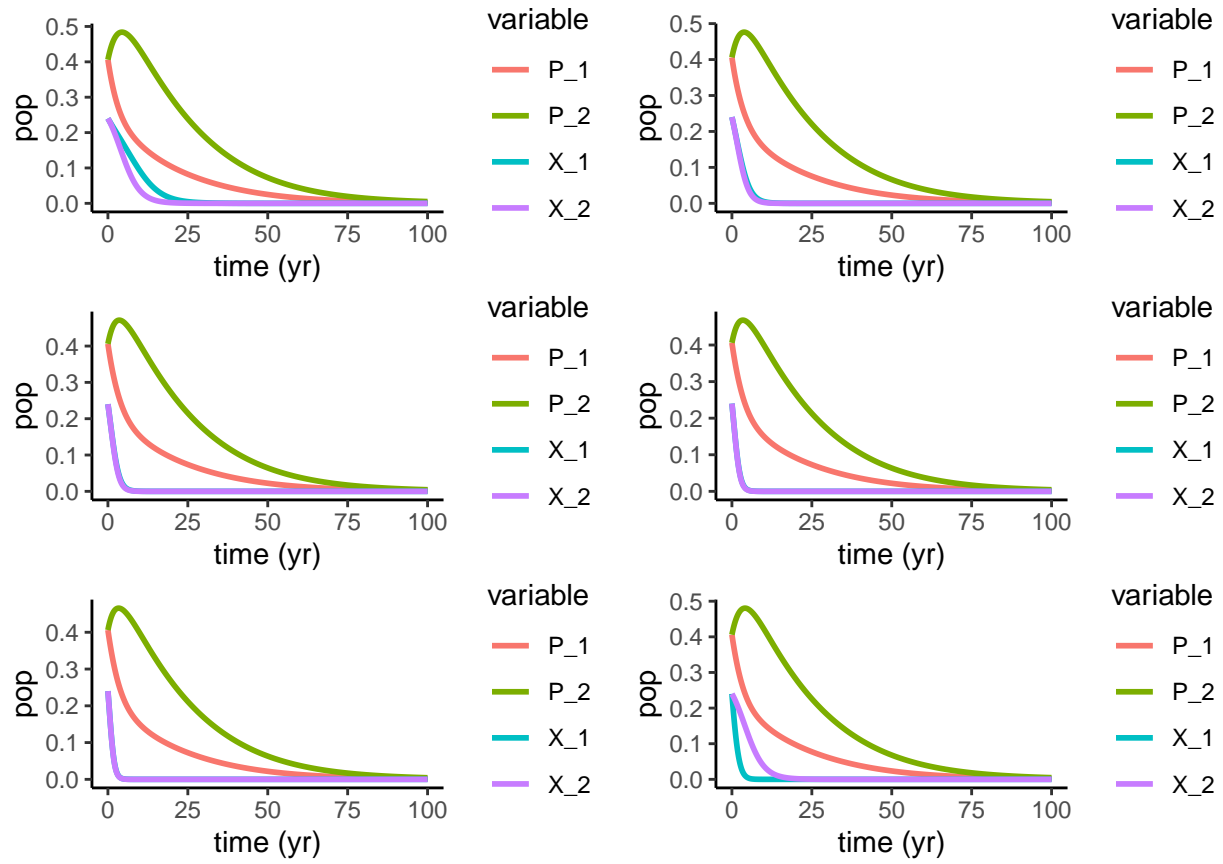
Figure 12: prop - Population influence on the other
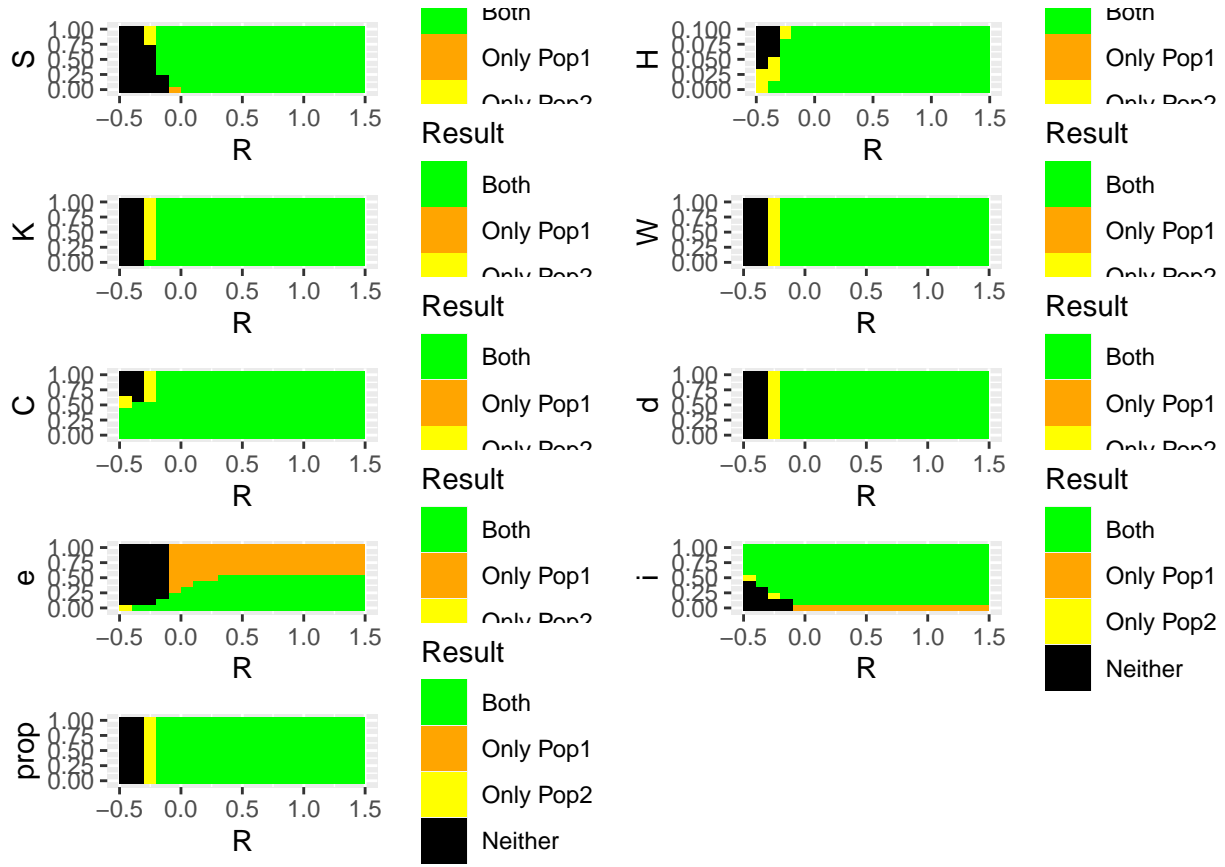
Figure 13: R parameter planes
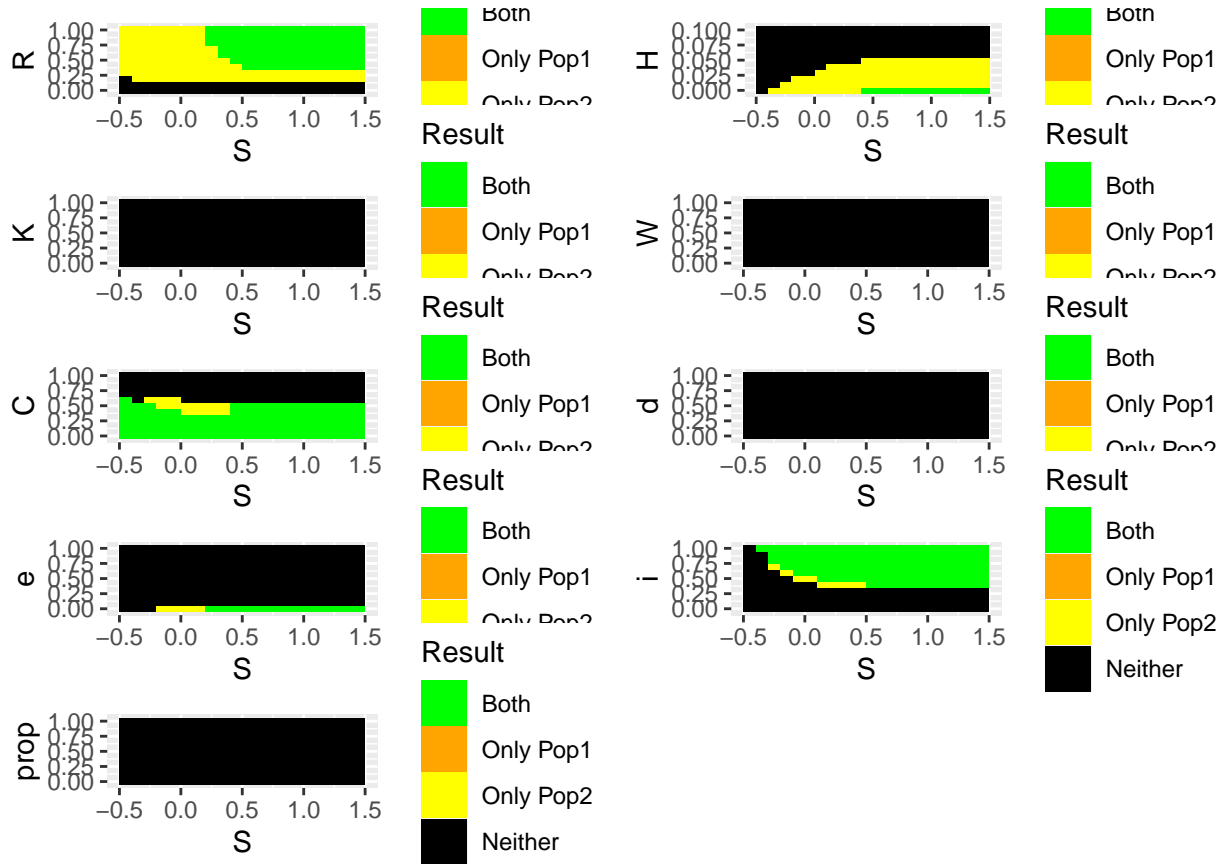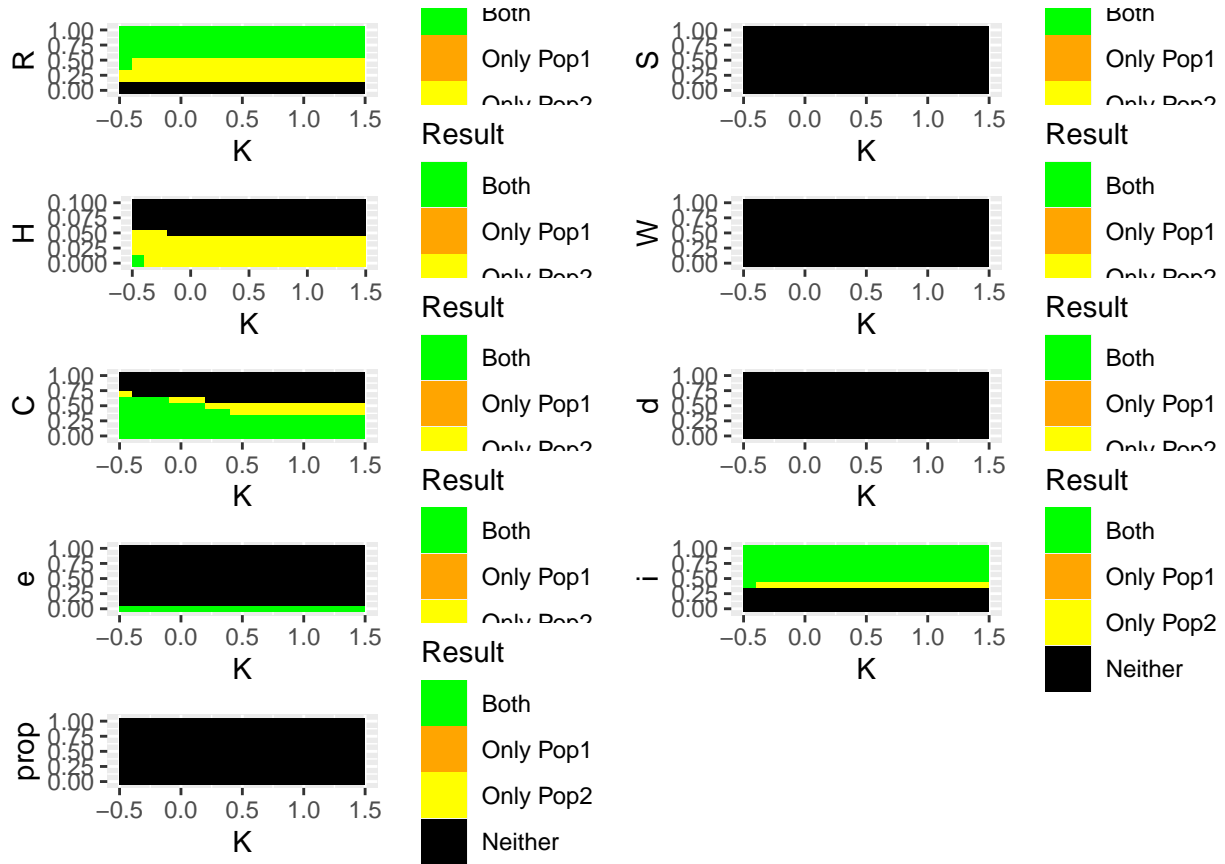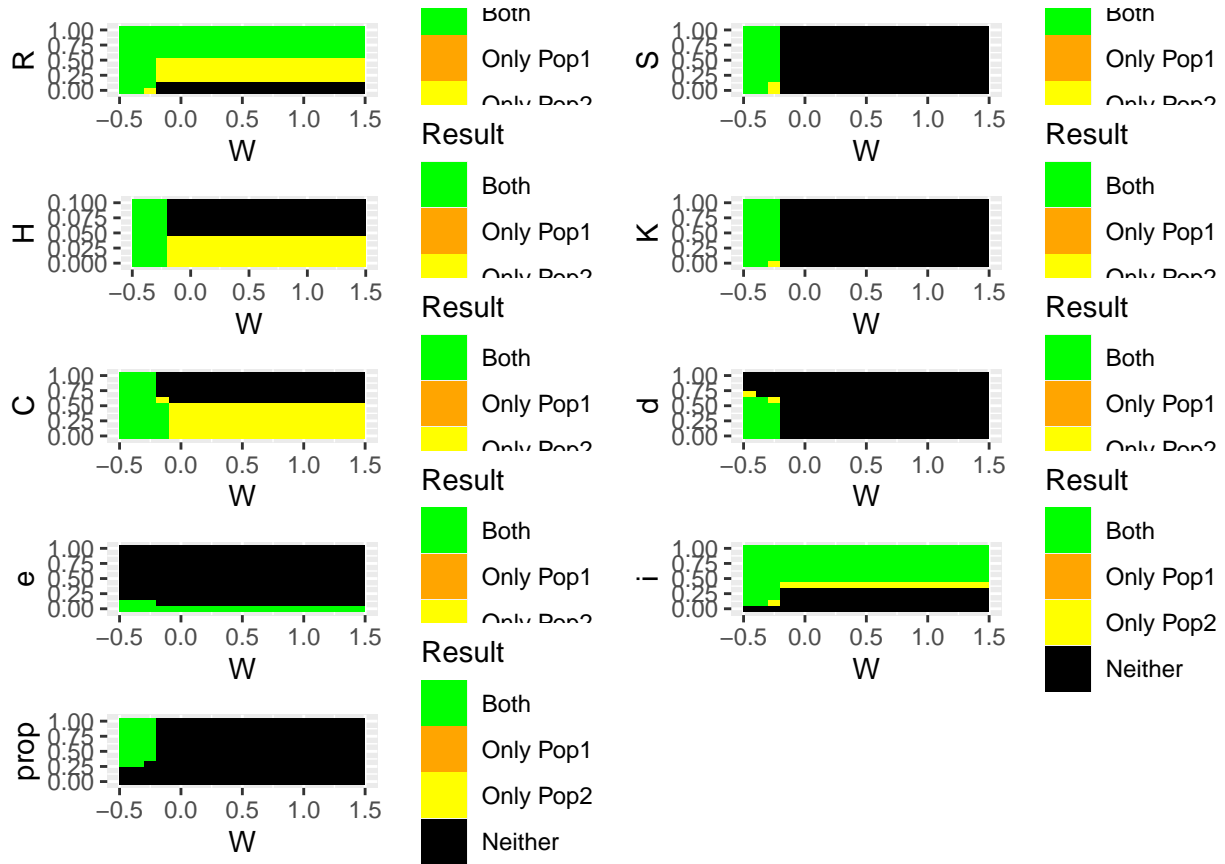
Figure 14: S parameter planes
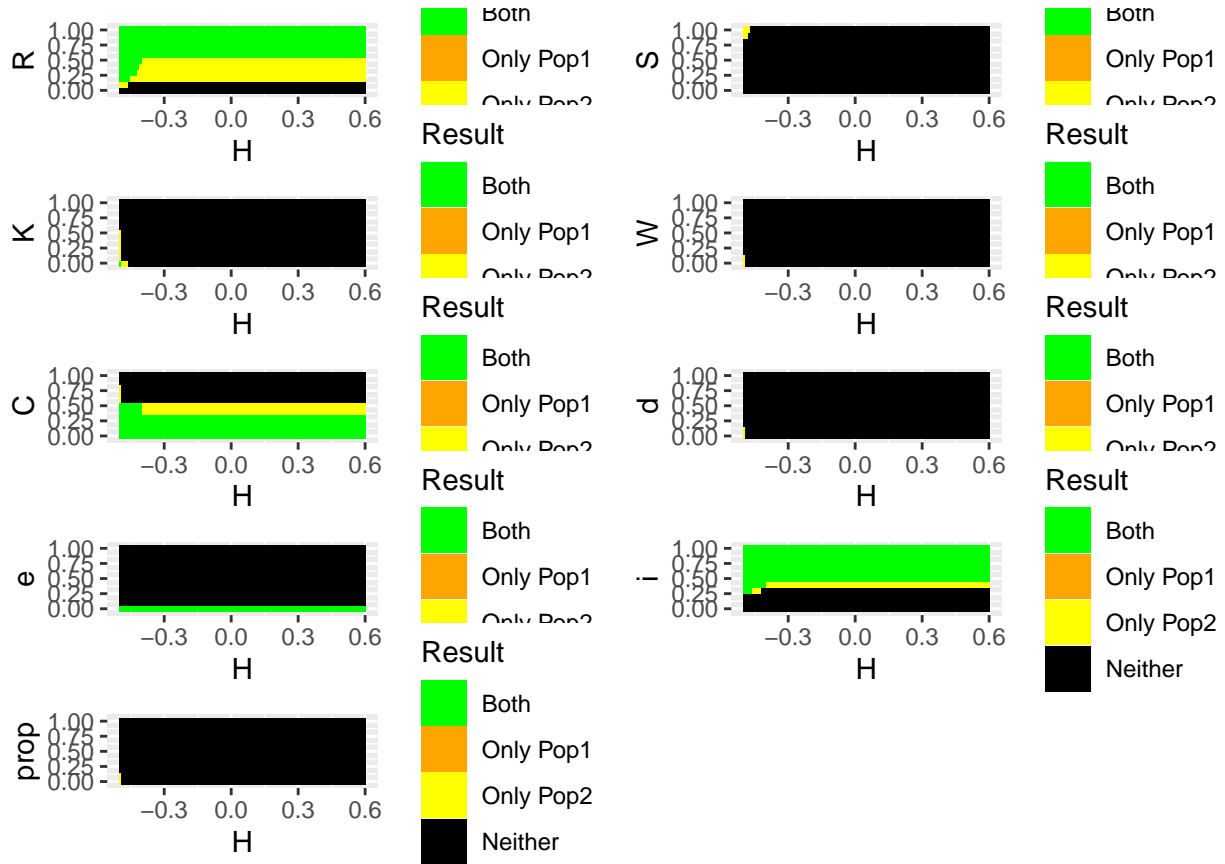
Figure 15: h parameter planes

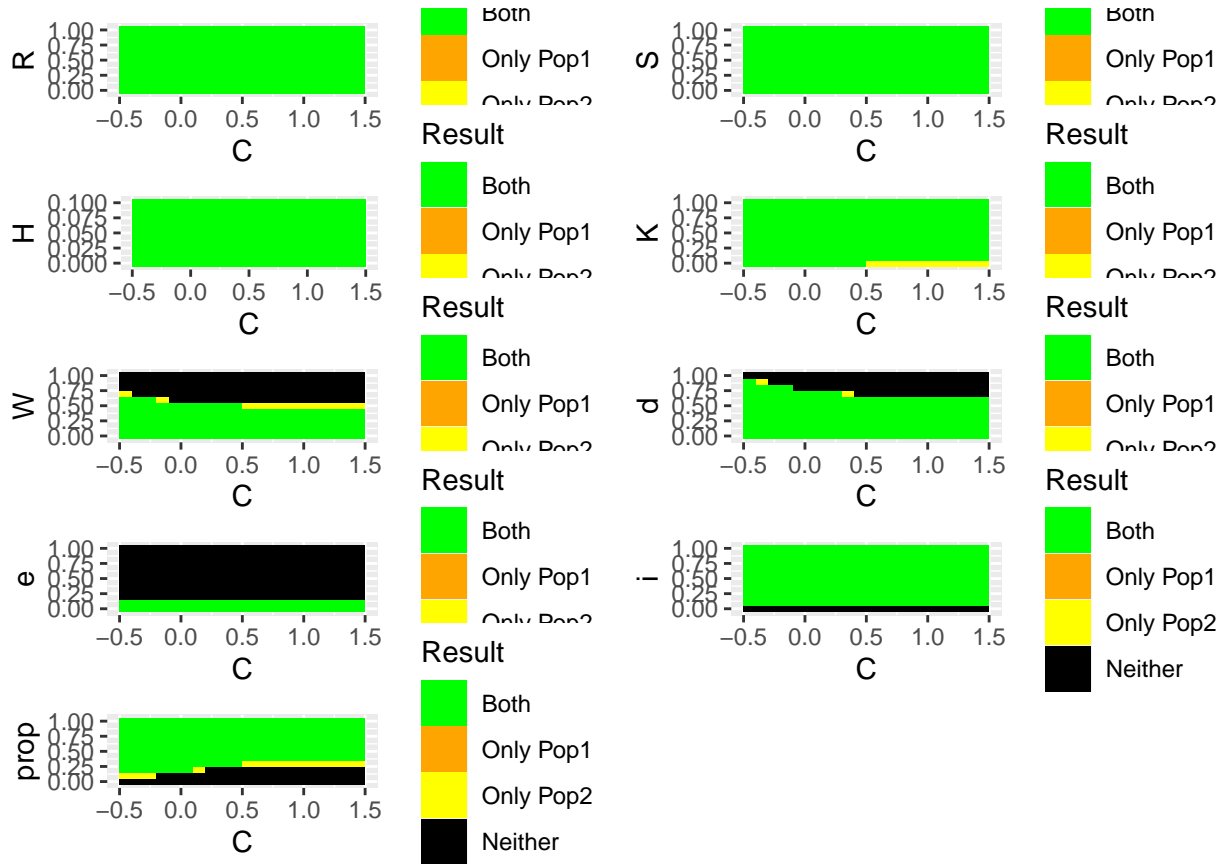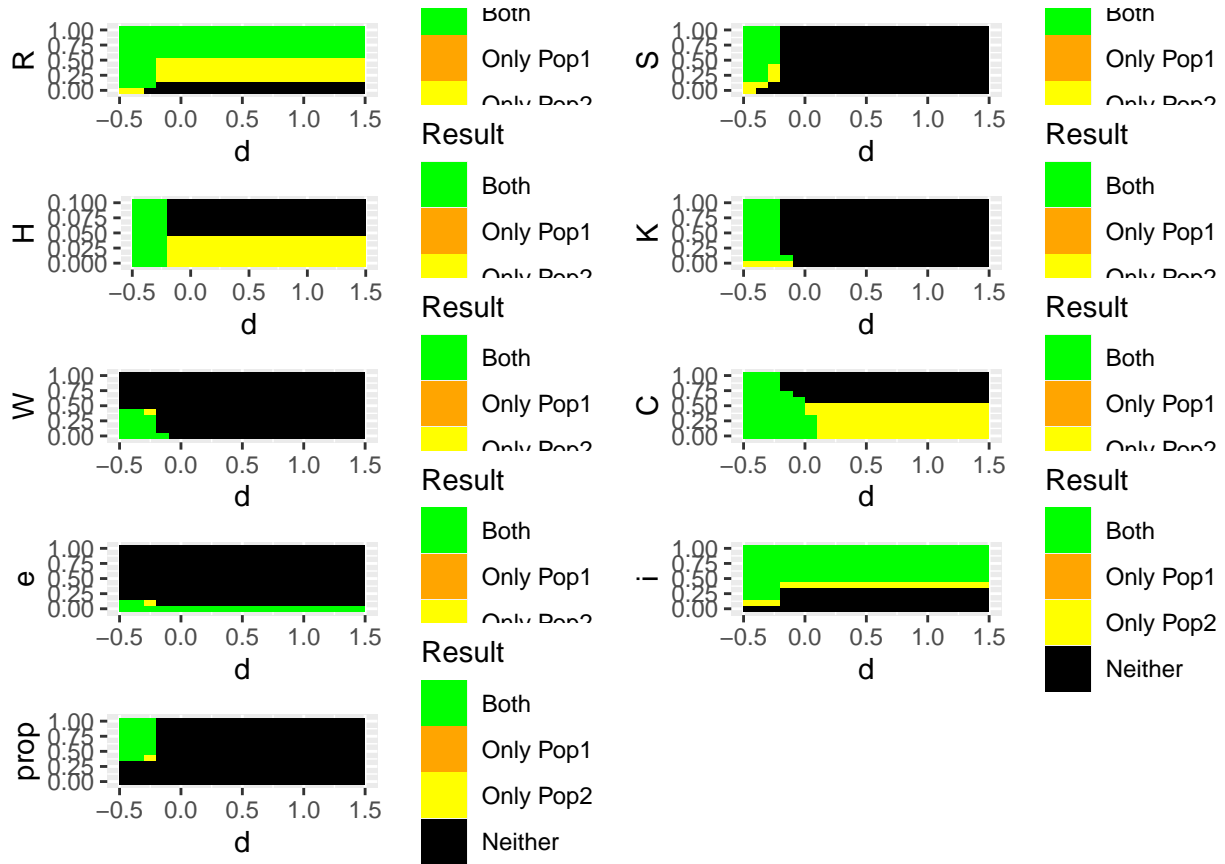Figure 16: K parameter planes ranging from 0-1

Figure 17: w parameter planes

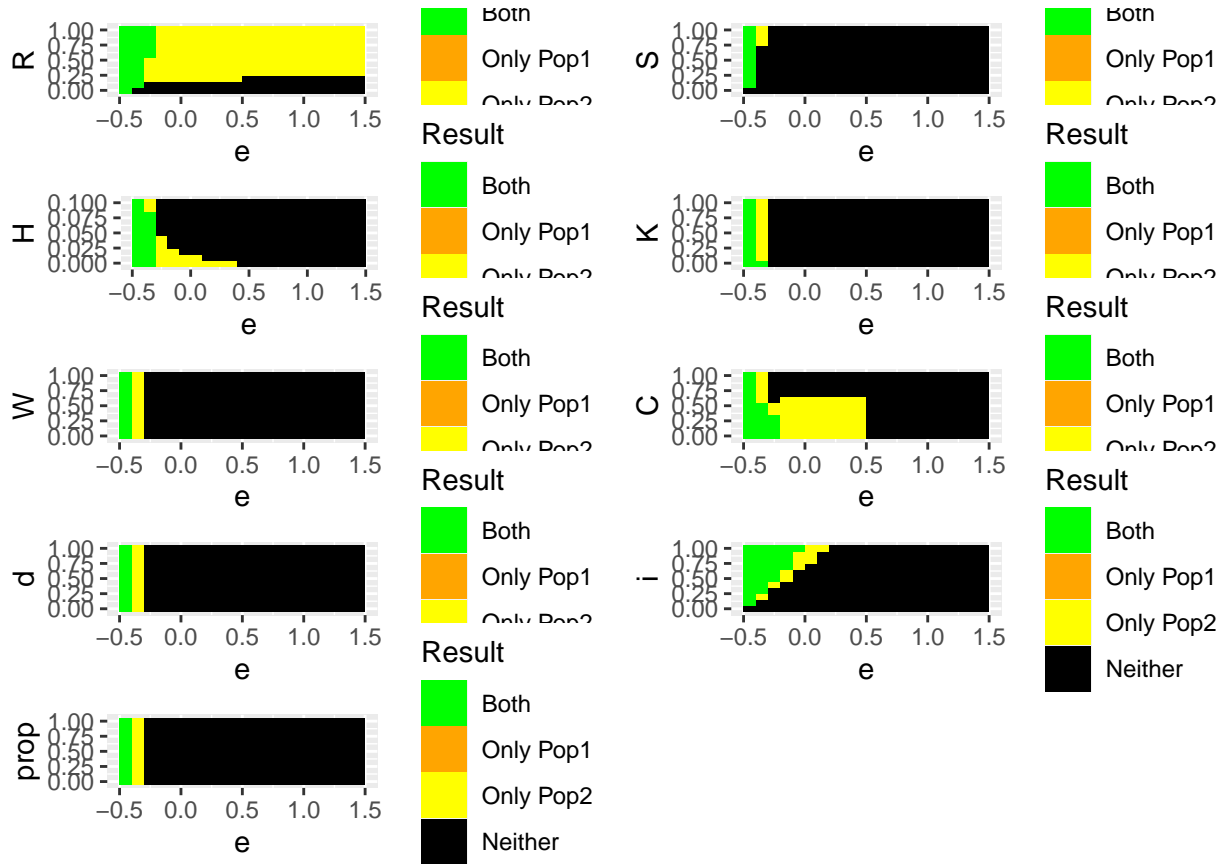Figure 18: c parameter planes

Figure 19: d parameter planes

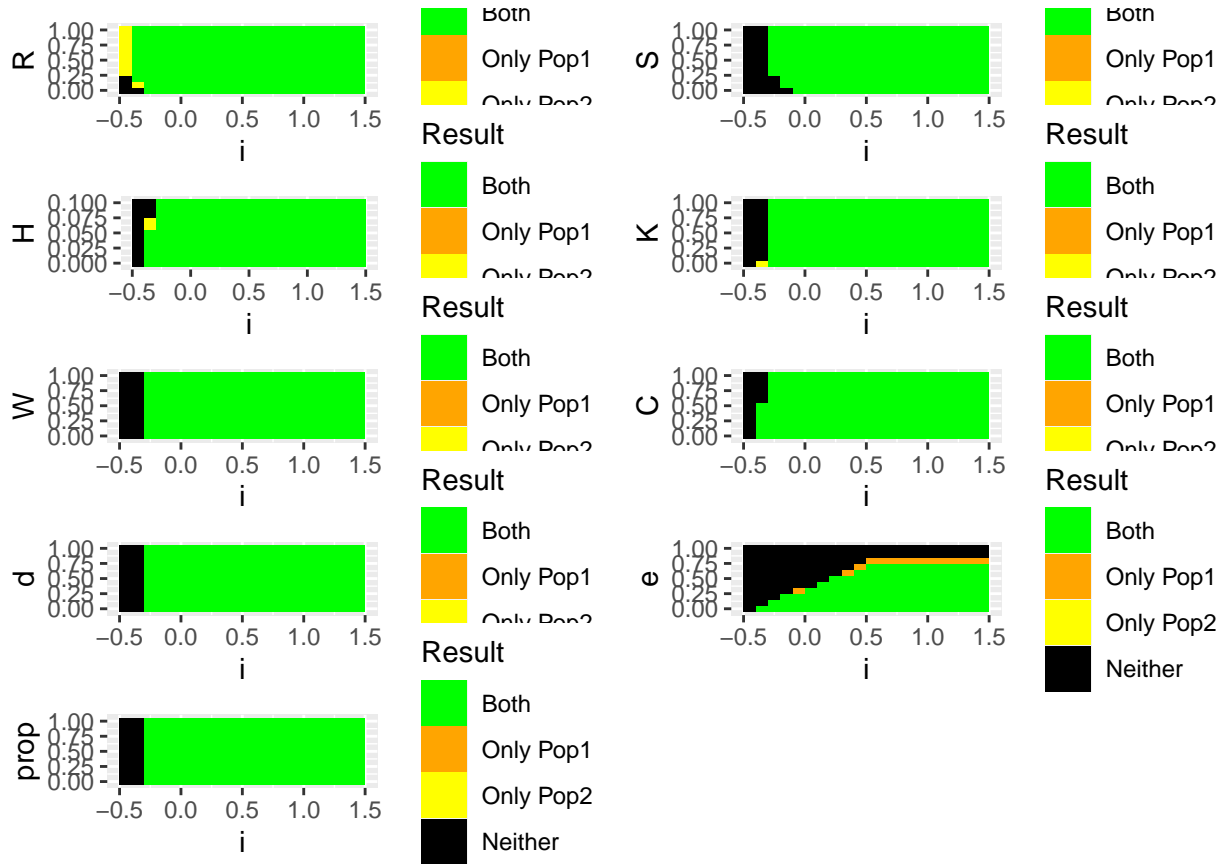Figure 20: e parameter planes
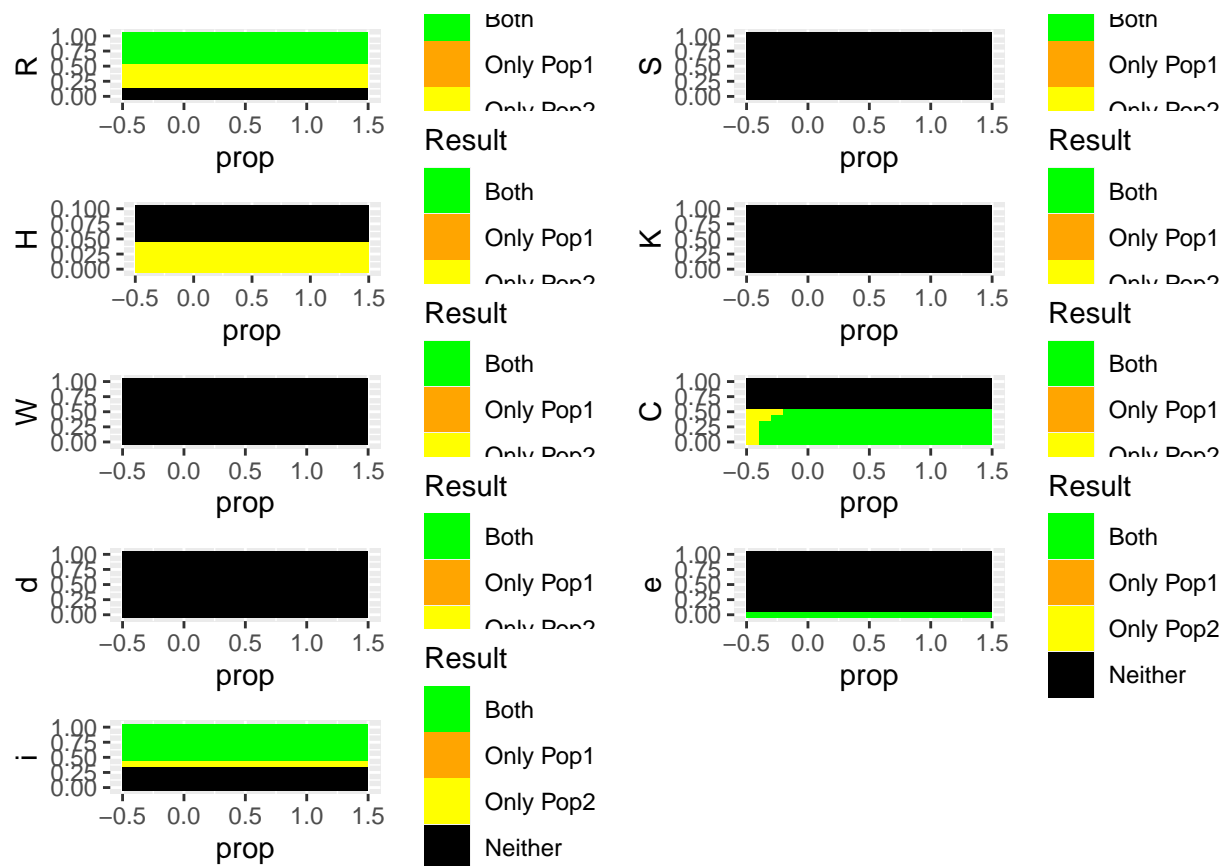
Figure 21: i parameter planes

Figure 22: prop parameter planes
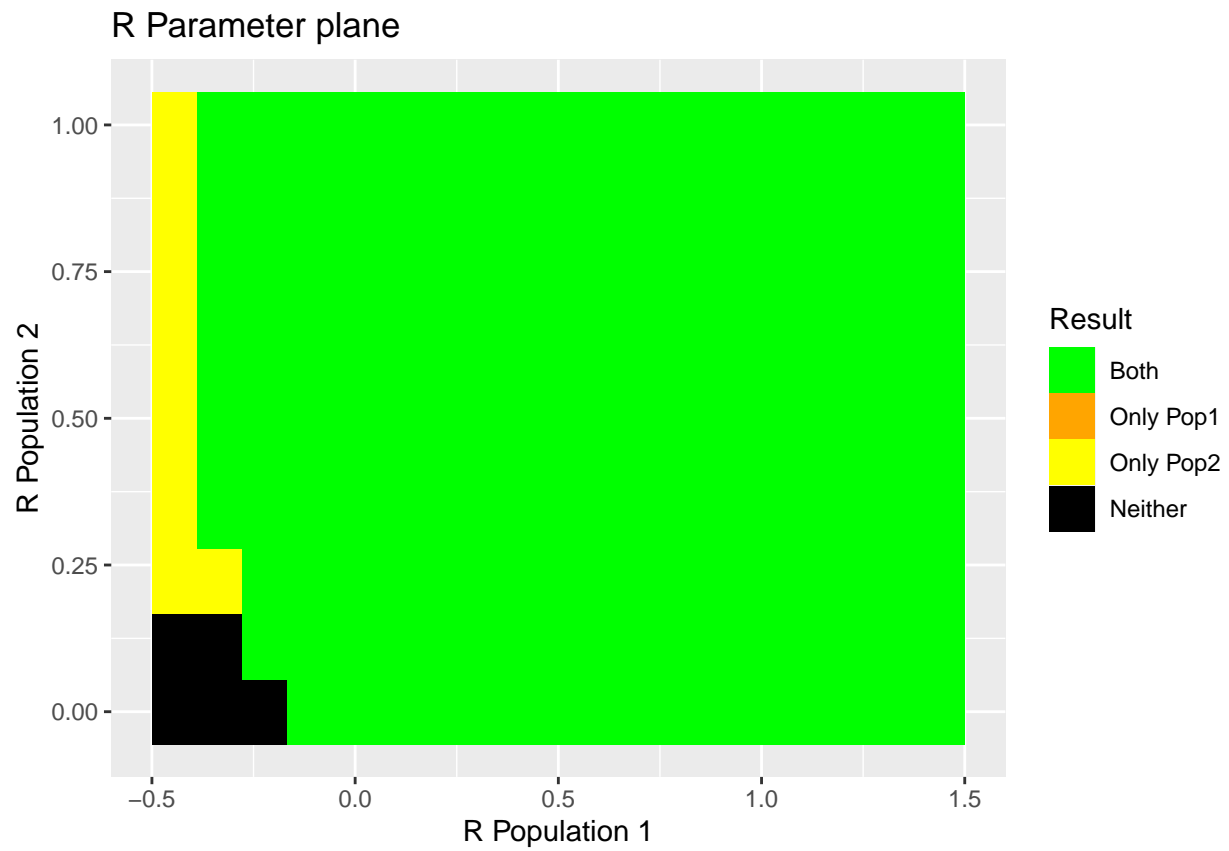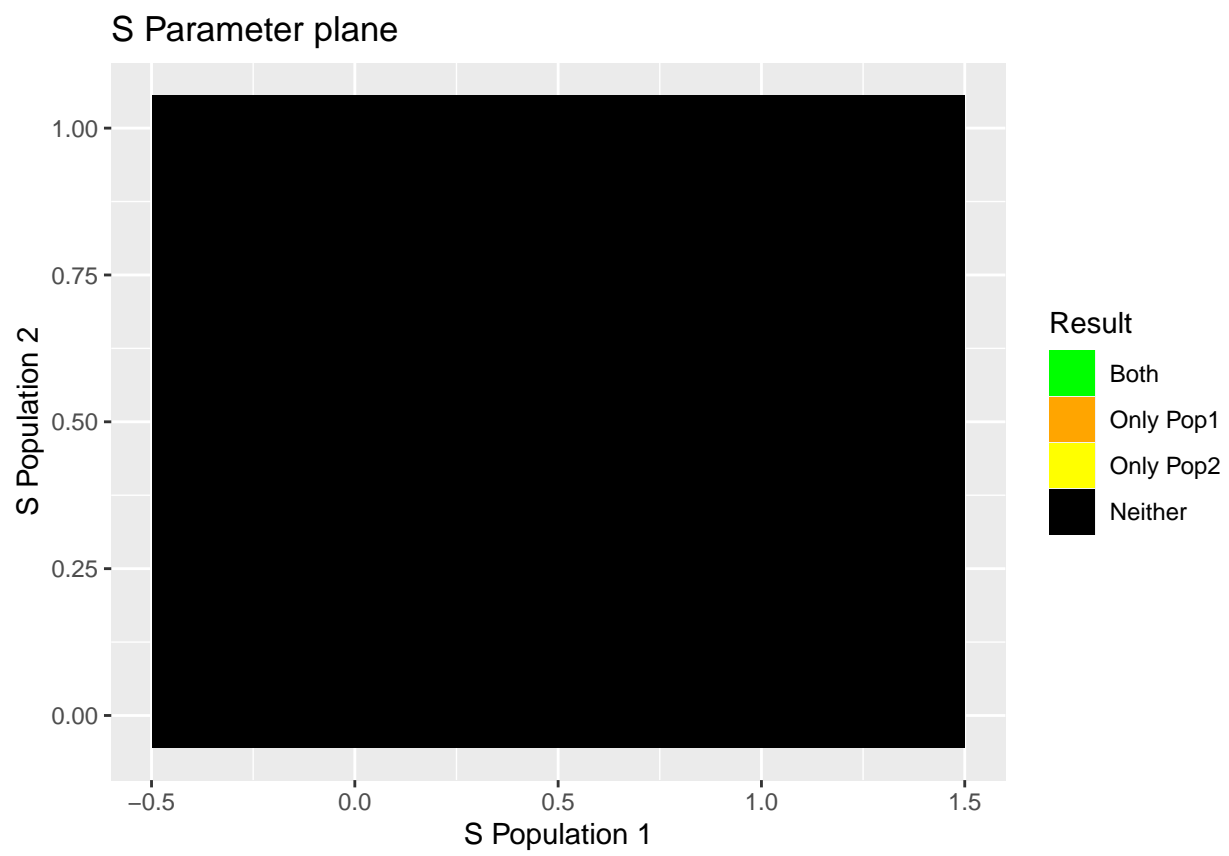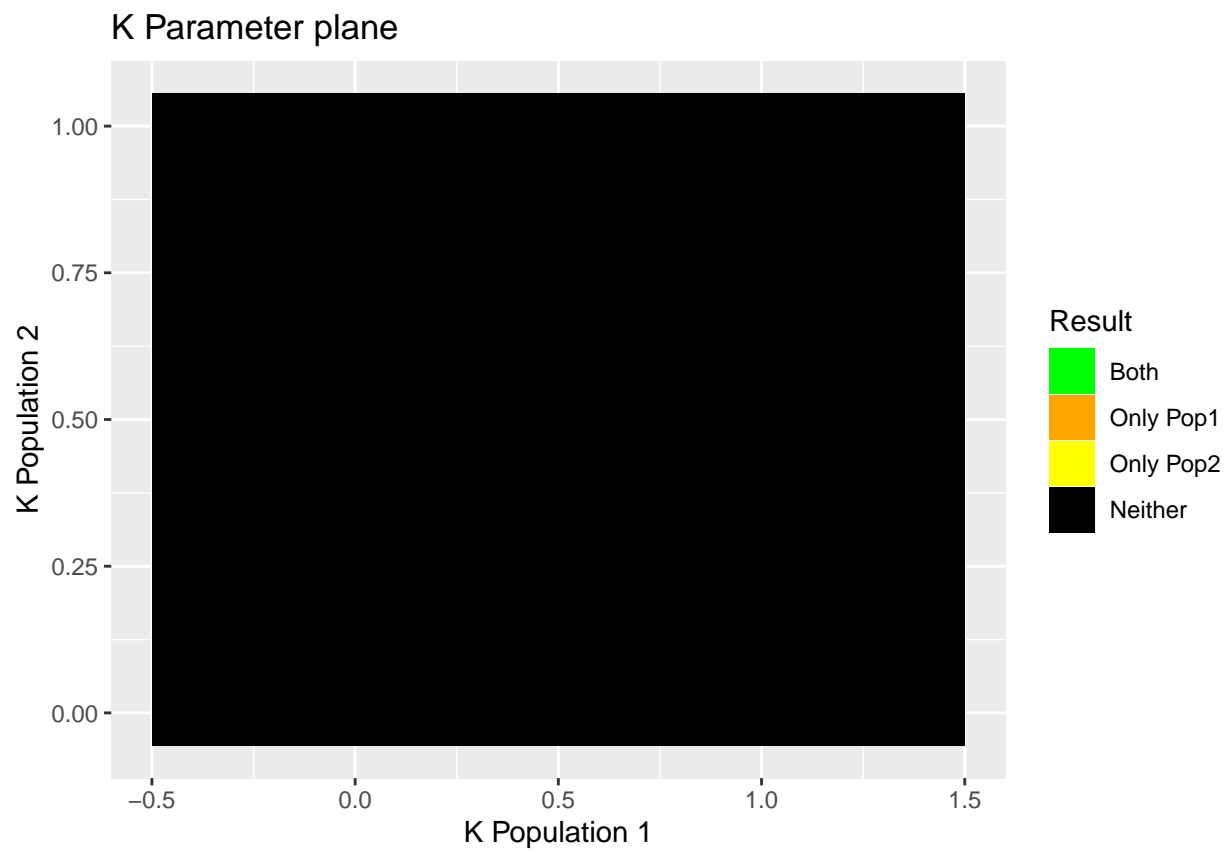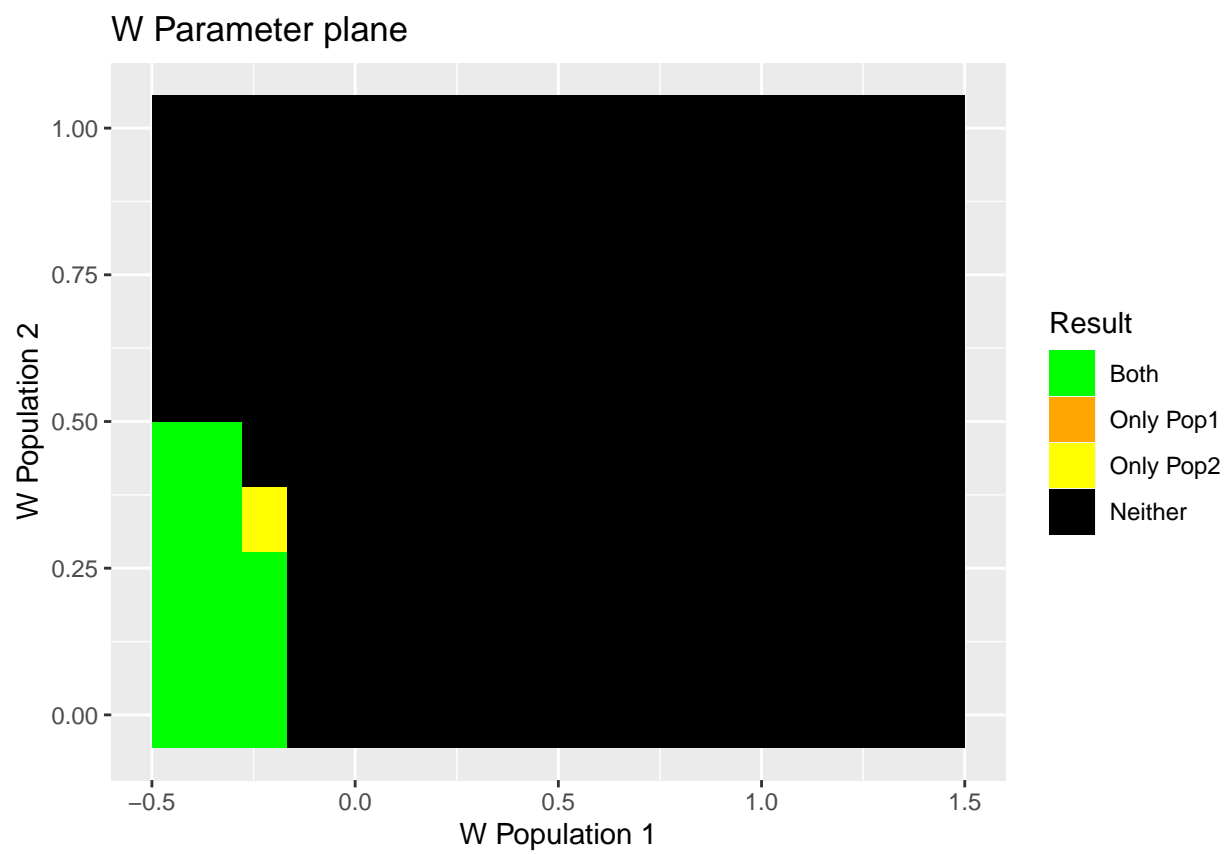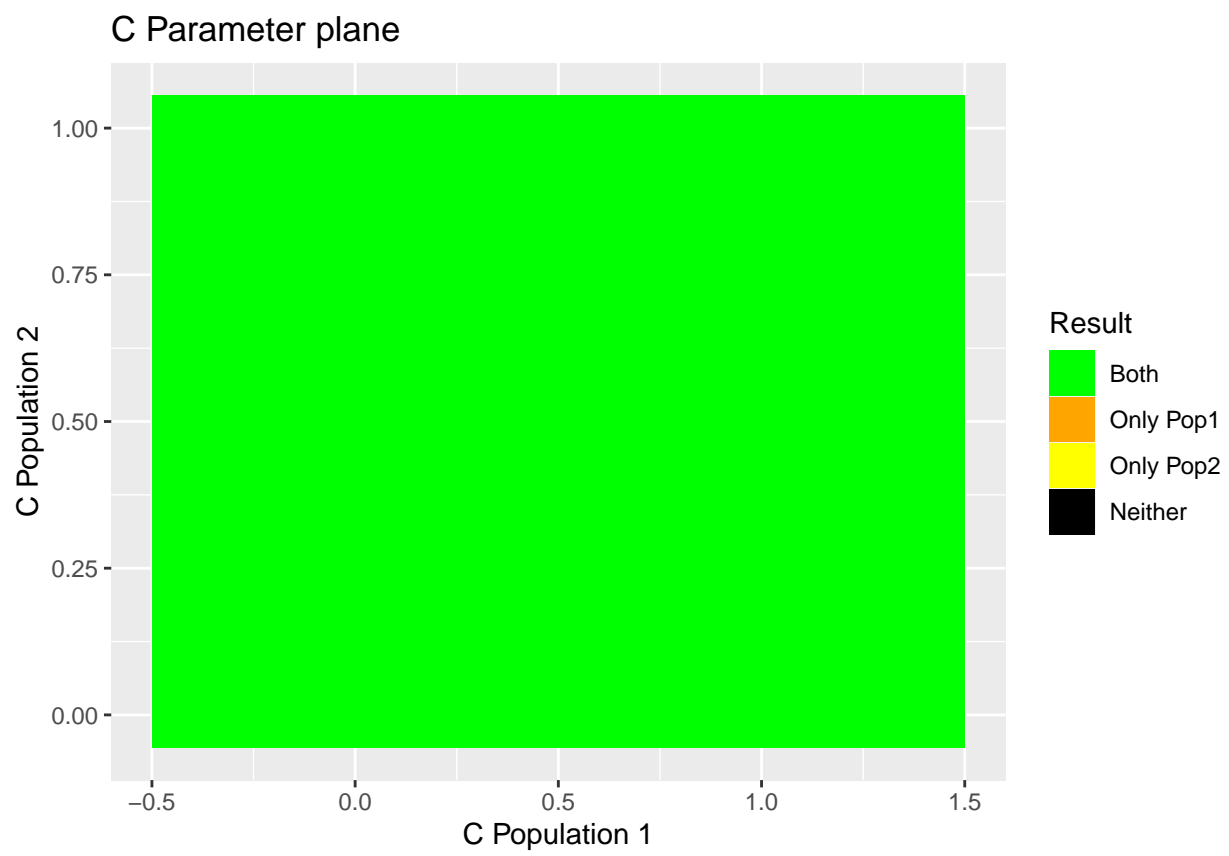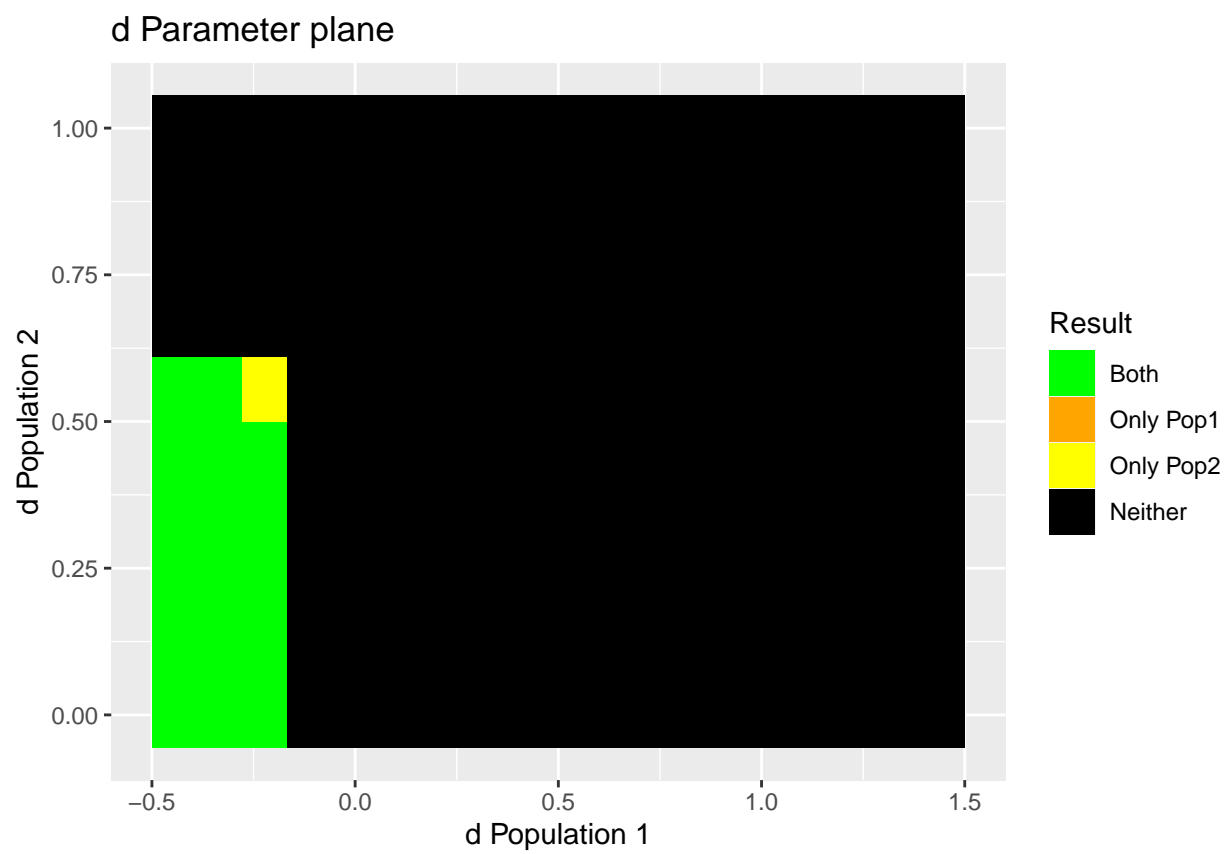
Figure 23: r population planes

Figure 24: s population planes

Figure 25: h population planes

Figure 26: k population planes 0 to 1

W Parameter plane

Figure 27: w population planes

C Parameter plane

Figure 28: c population planes

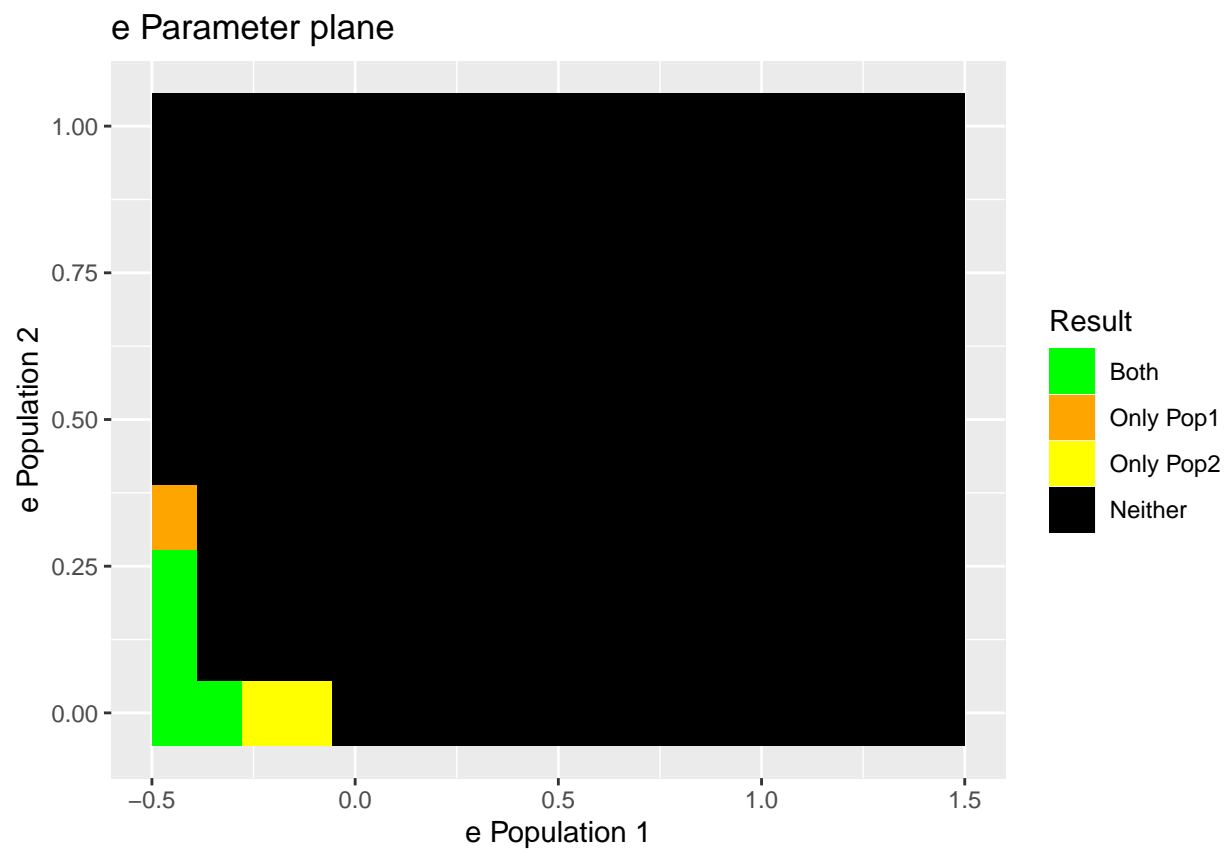Figure 29: d population planes
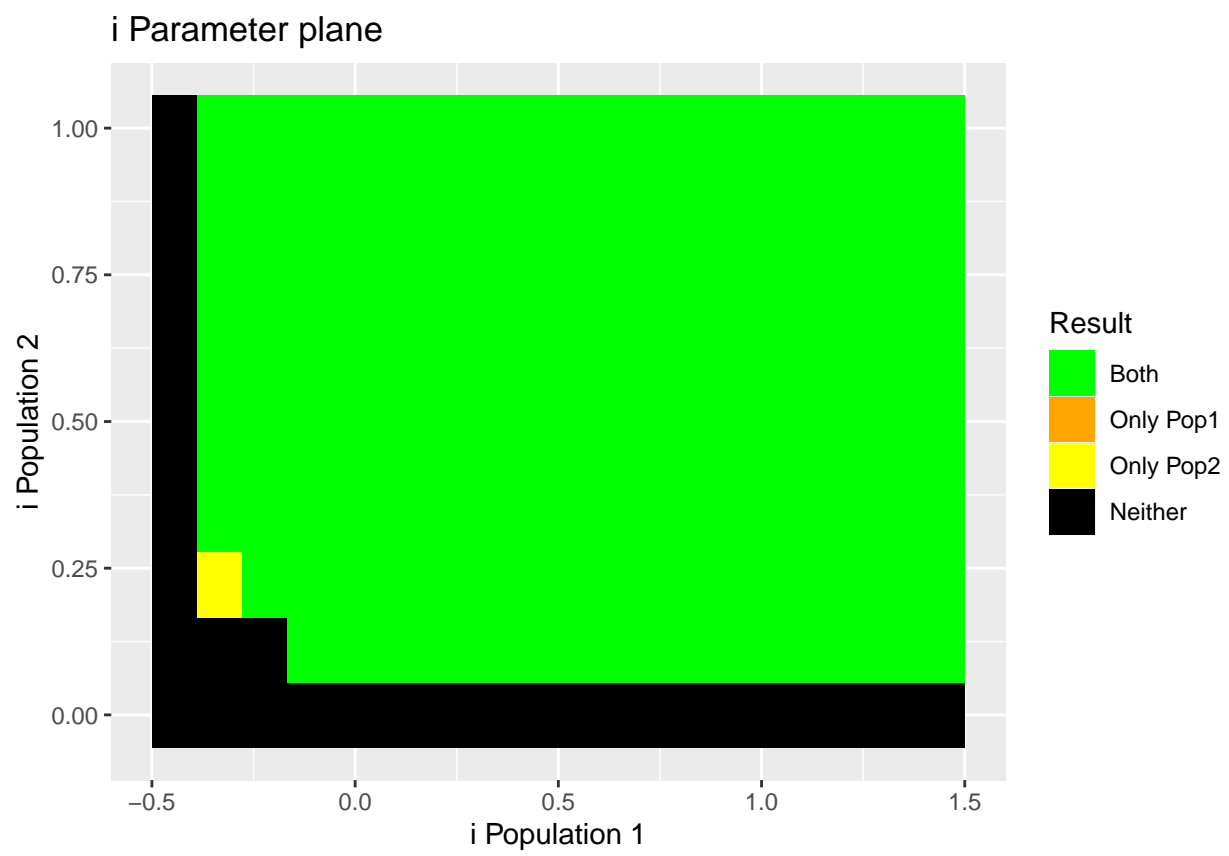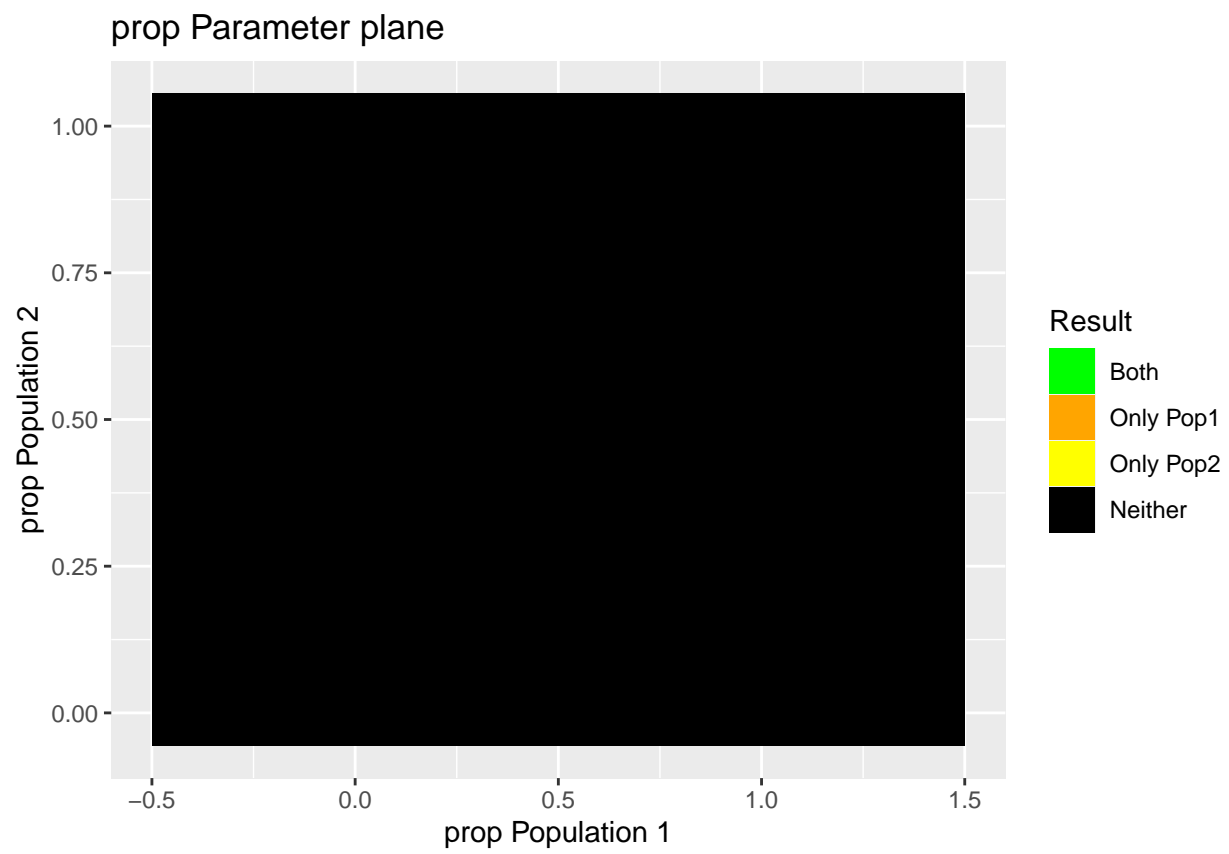
e Parameter plane

Figure 30: e population planes

Figure 31: i population planes

Figure 32: prop population planes