

# BauchModel\_GrowthandHarvestSimilarOneGroupLowInfluence

Sophie Wulfinf

23 March, 2023, 15:34



Figure 1: Original Bauch Model

Table 1: Parameter values used in this analysis

Parameter	Population_1	Population_2	Def
r	0.2	0.2	Fish net growth
s	0.8	0.8	Supply and demand
h	0.15	0.15	Harvesting efficiency
k	0.17	0.17	Social learning rate
w	0.35	0.35	Conservation cost
c	1.68	1.68	Rarity valuation
d	0.2	0.2	Social norm strength (within pop)
e	0.01	0.01	Fish emigration (from patch)
i	0.01	0.01	Fish immigration (from opposite patch)
prop	0.01	0.1	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: THAMPI PARAMS SIMILAR GRWOTH AND HARVEST PARAMS WITH ONE GROUP LOW INFLUENCE

Function:

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

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

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

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

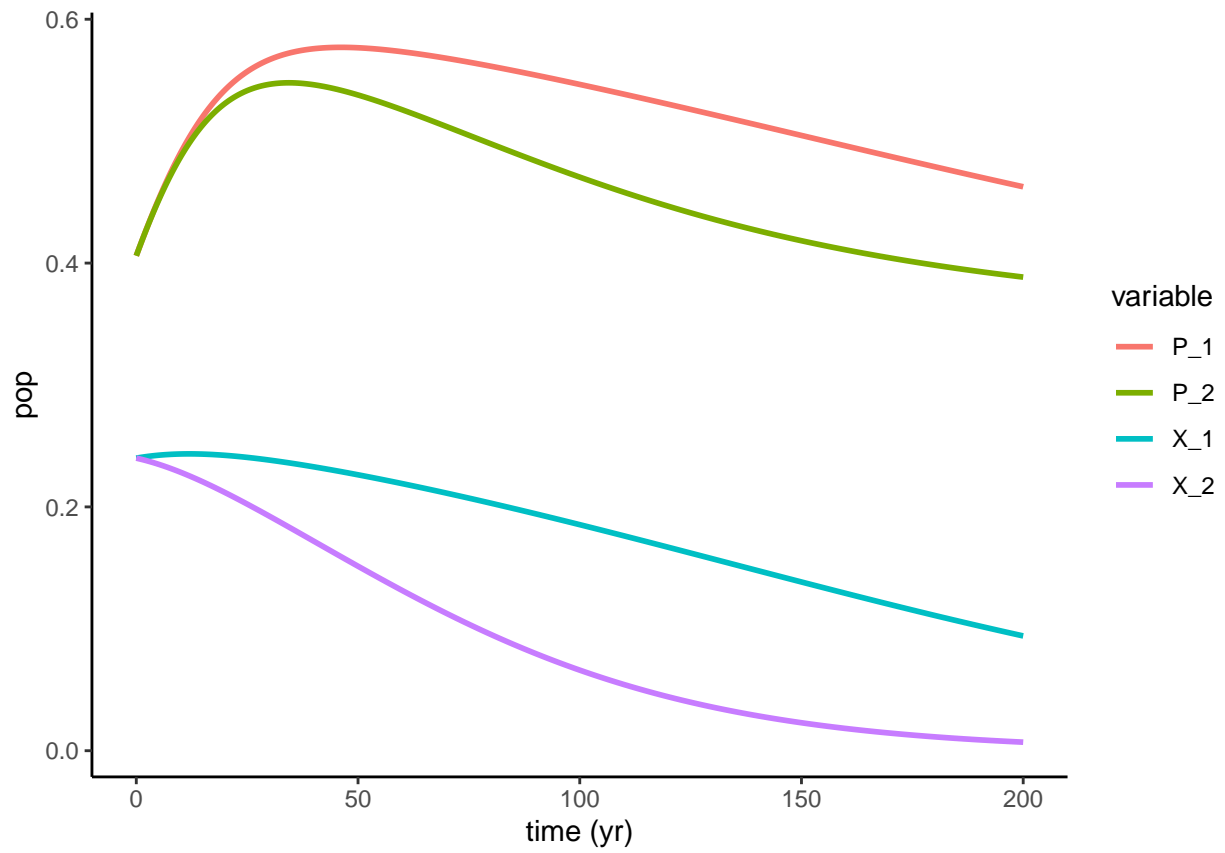


Figure 2: New Model with default paramters

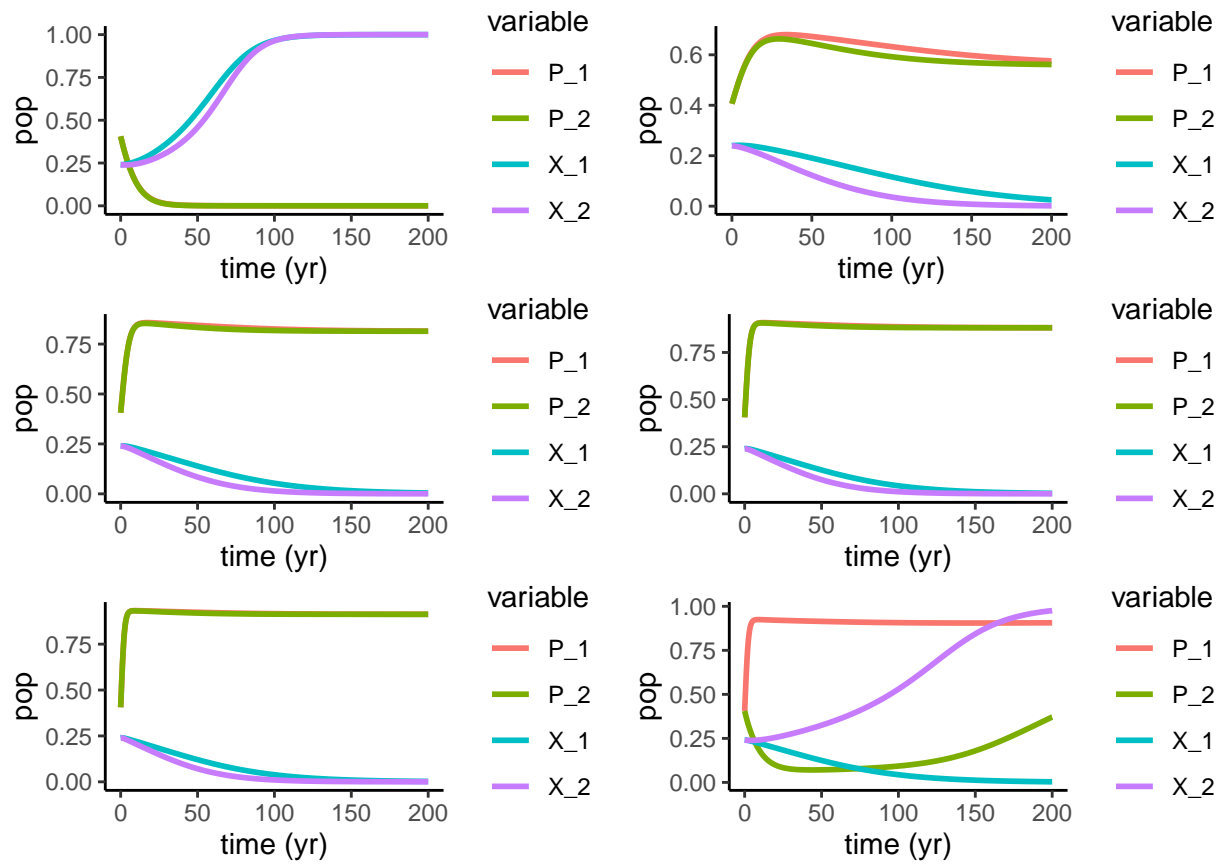


Figure 3: R - Net growth/fecundity, range 0 to 1

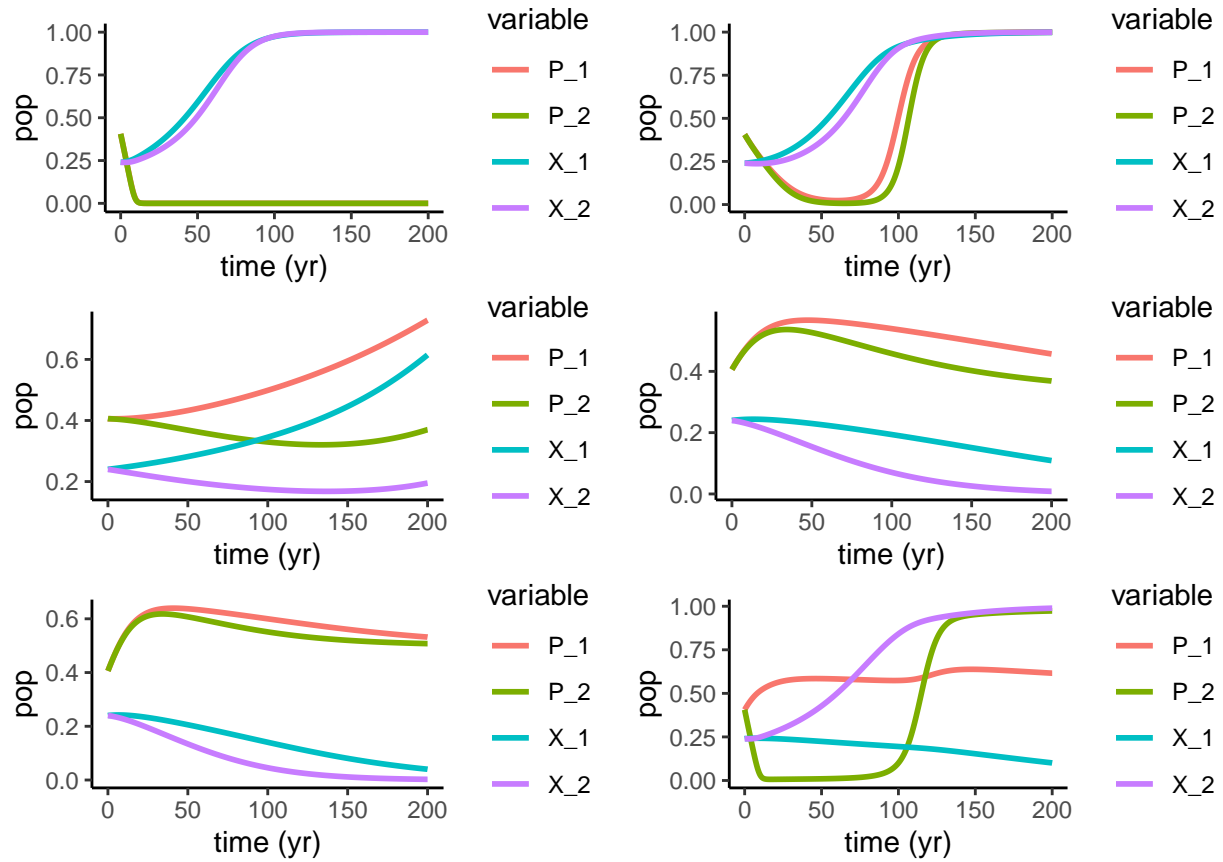


Figure 4: S - supply and demand, range 0.1 to 1

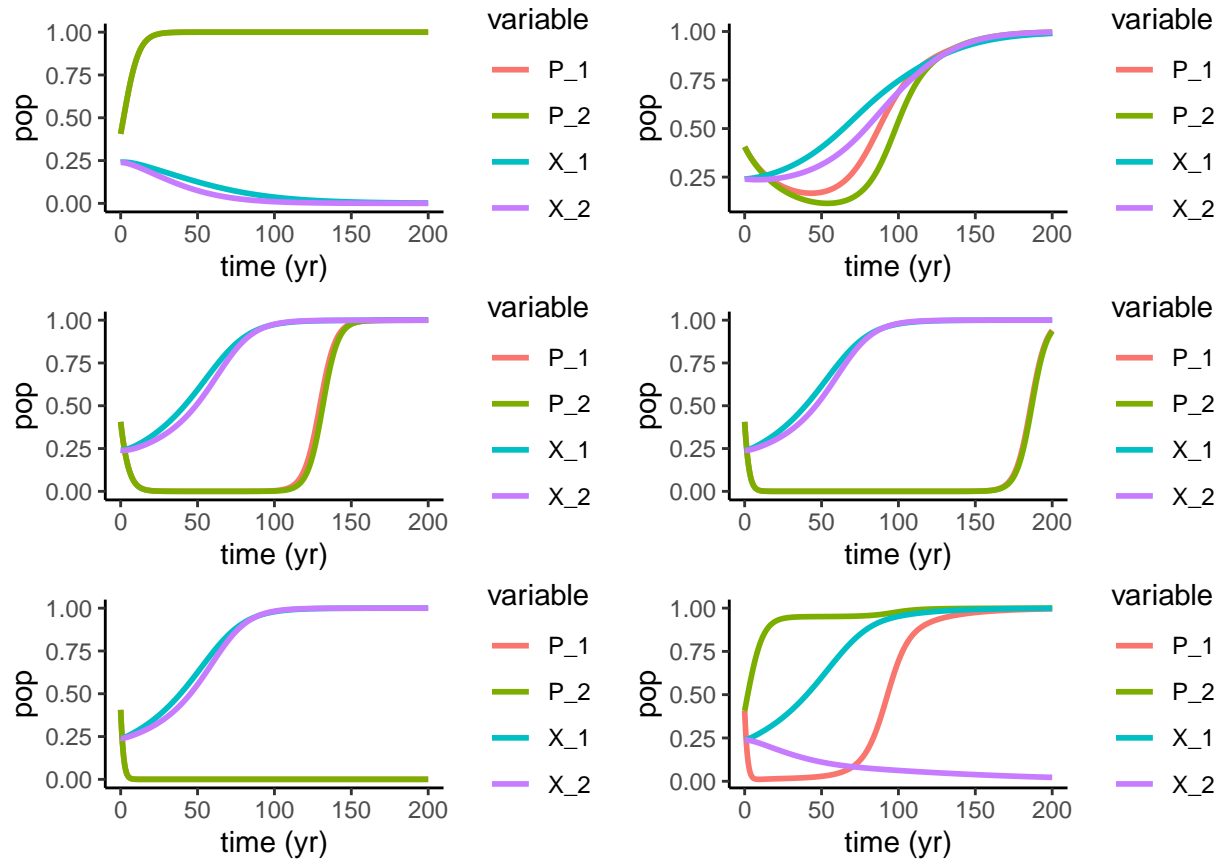


Figure 5: h - Harvesting efficiency, range 0 to 0.1. Note, default is .075

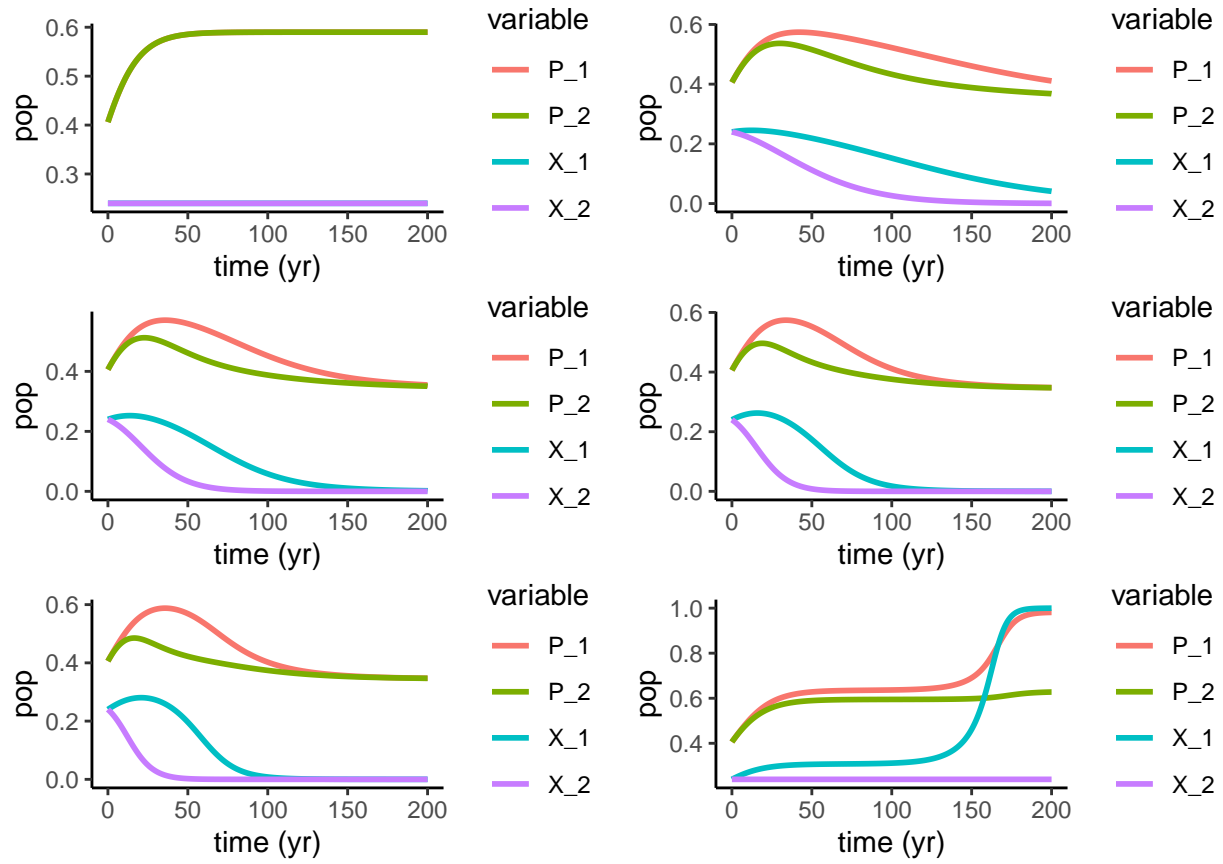


Figure 6: K - Social learning rate 0 to 1

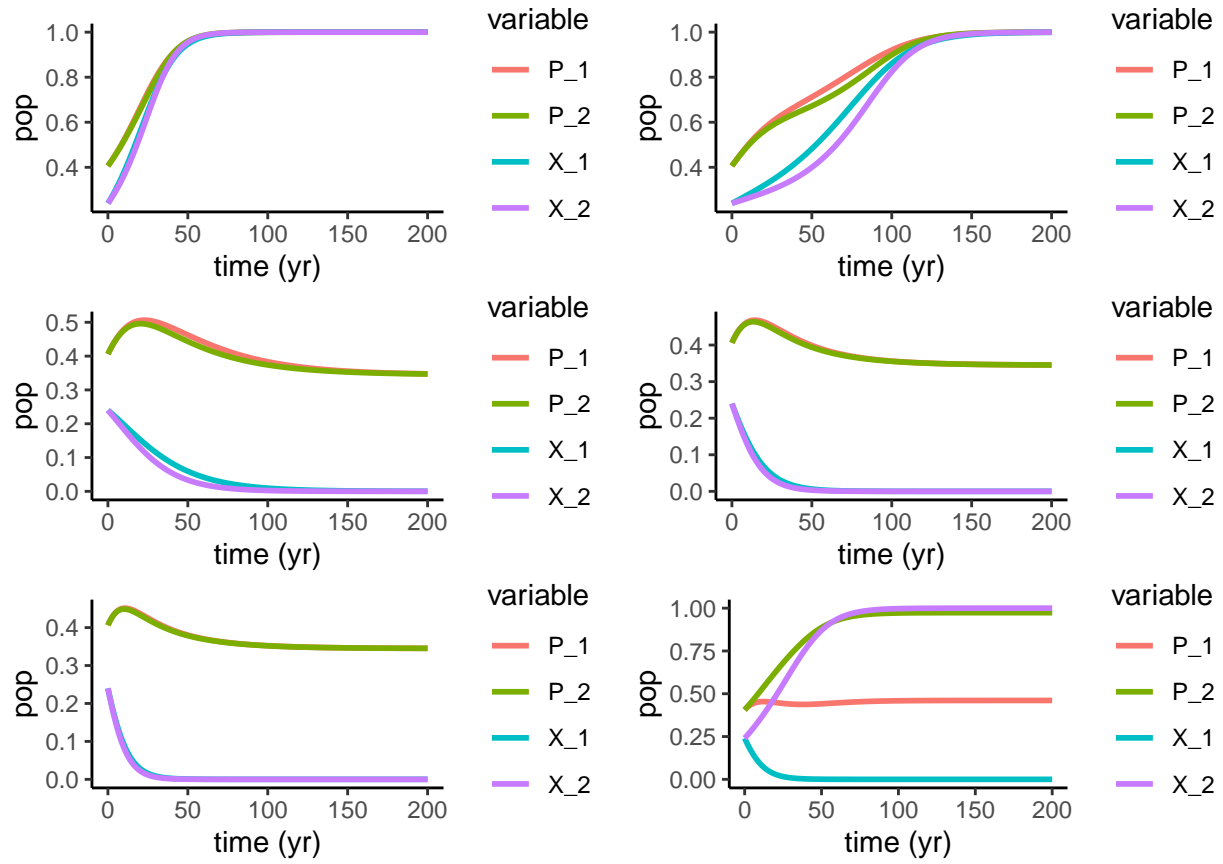


Figure 7: w - conservation costs



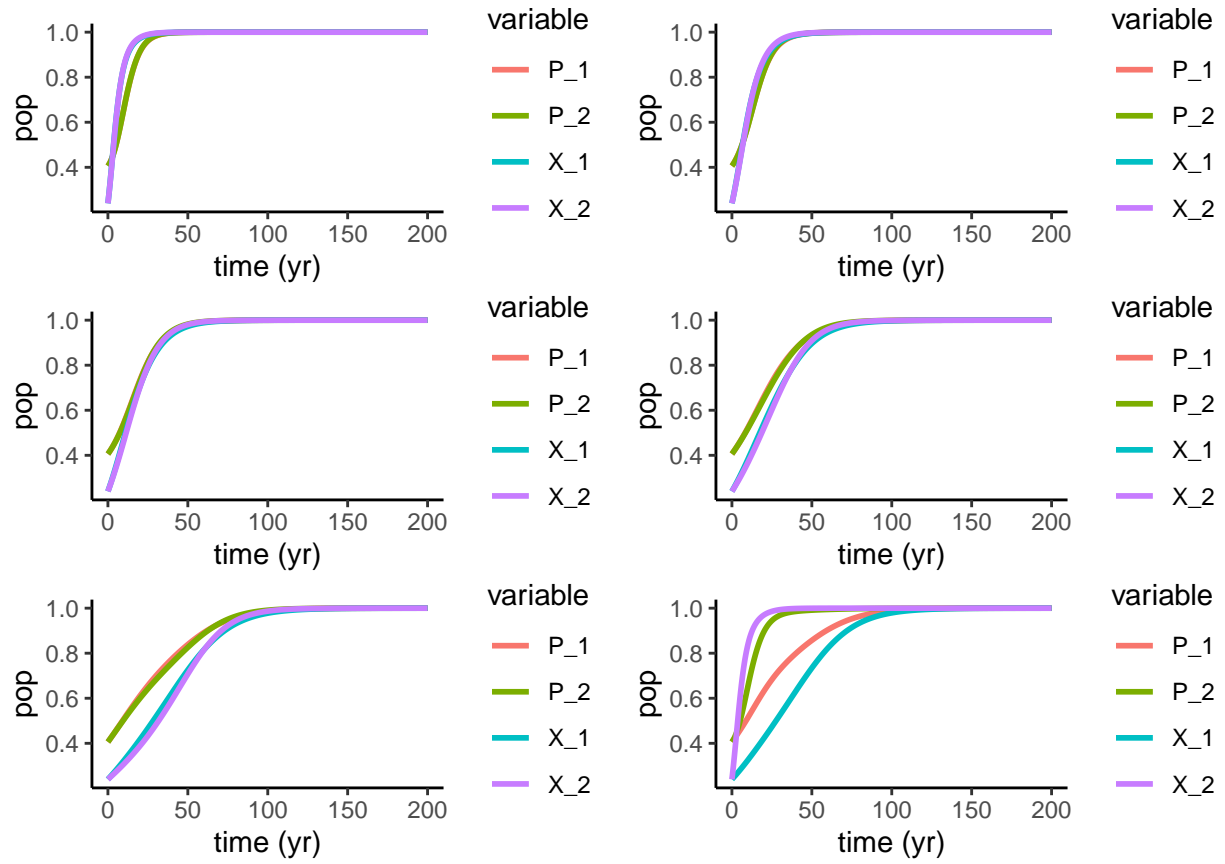


Figure 8: c - rarity valuation param

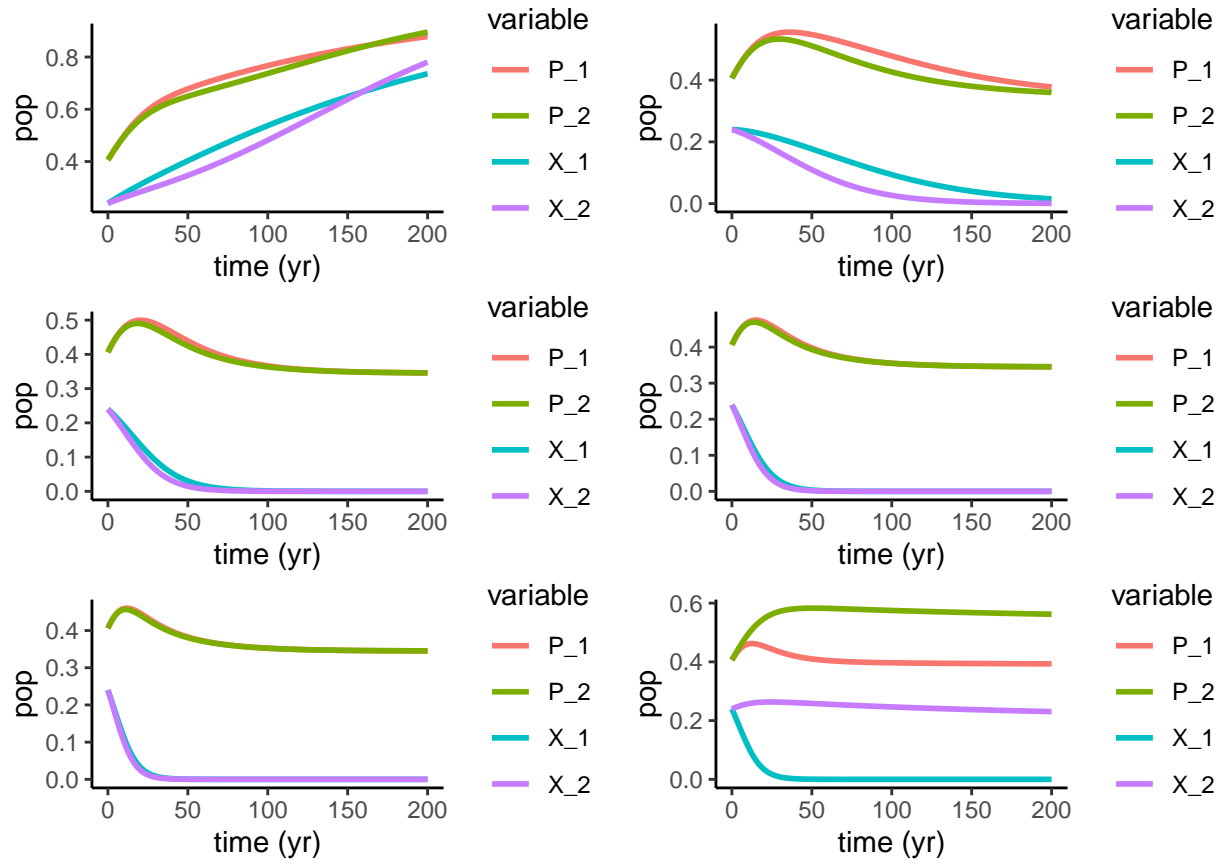


Figure 9: d - social norm strength

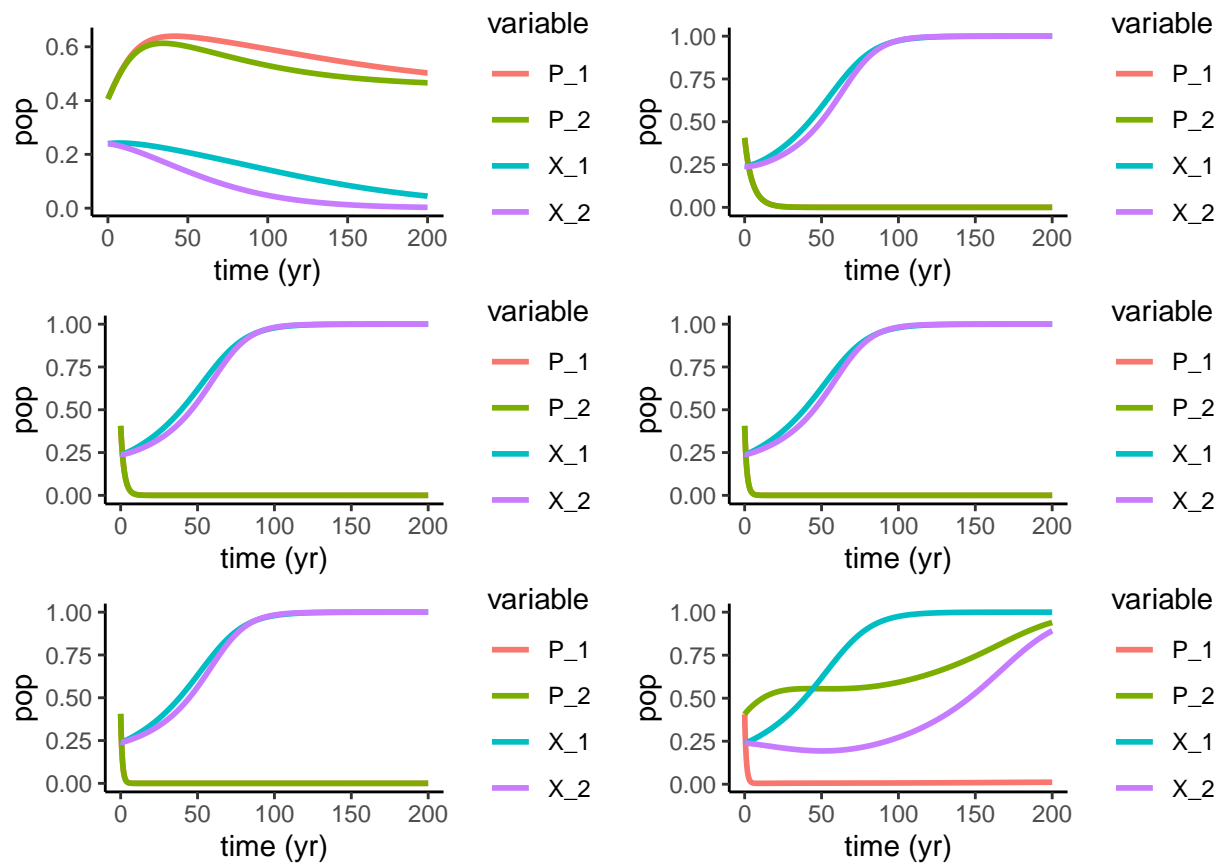


Figure 10: e - fish emigration

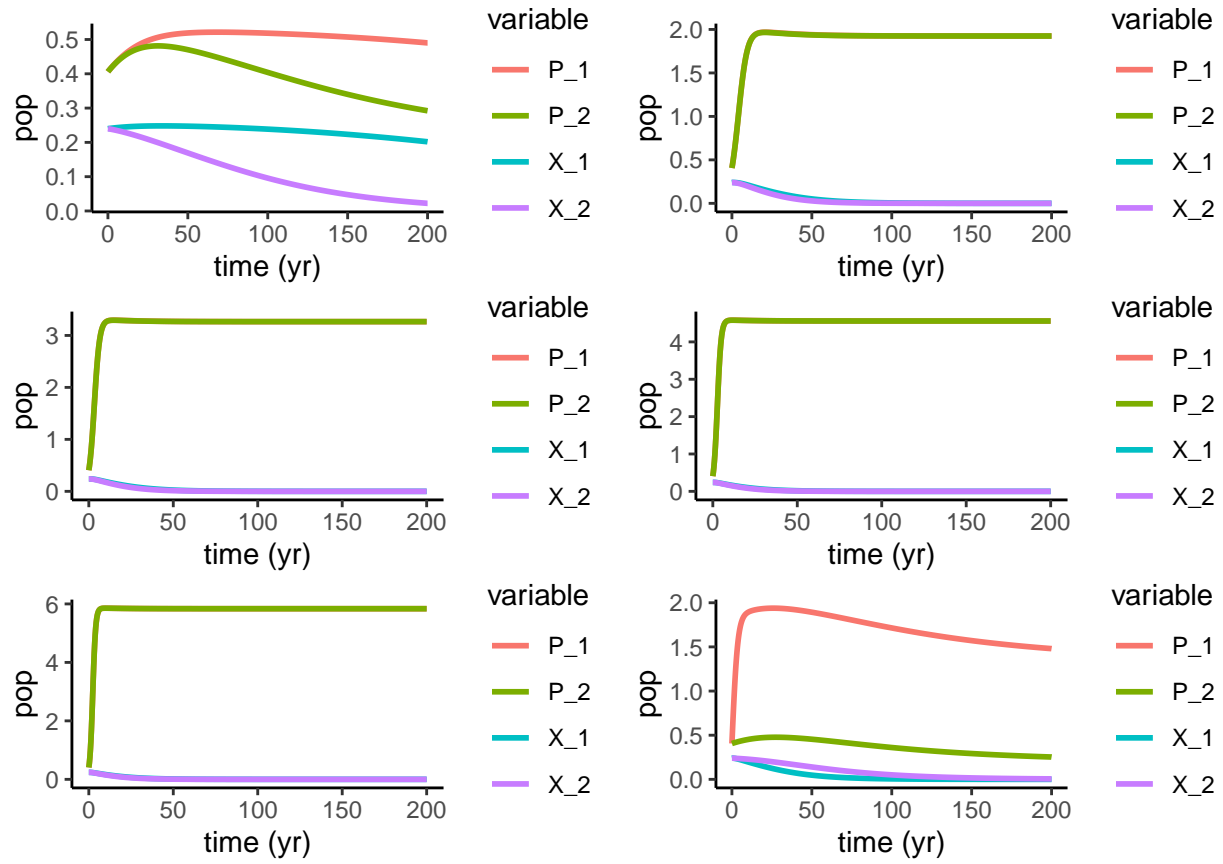


Figure 11: i - fish immigration

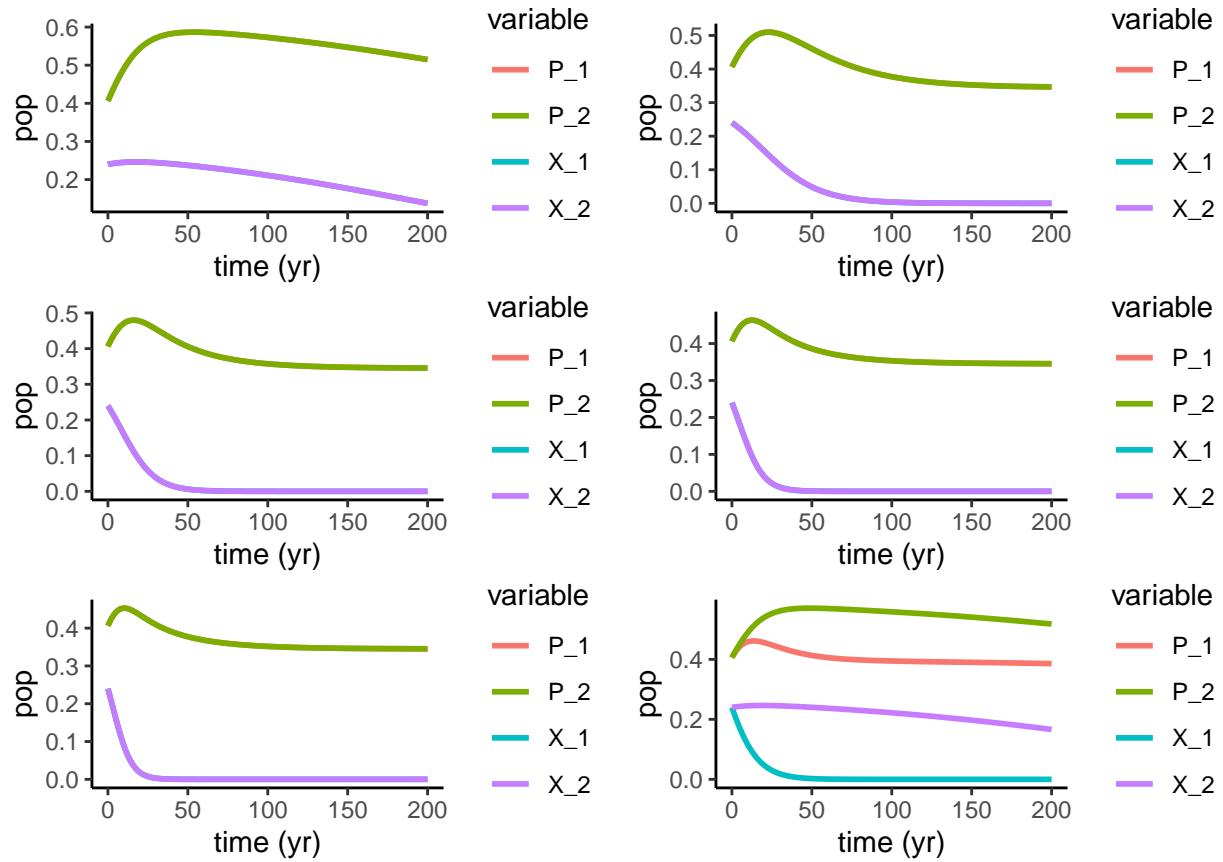


Figure 12: prop - Population influence on the other

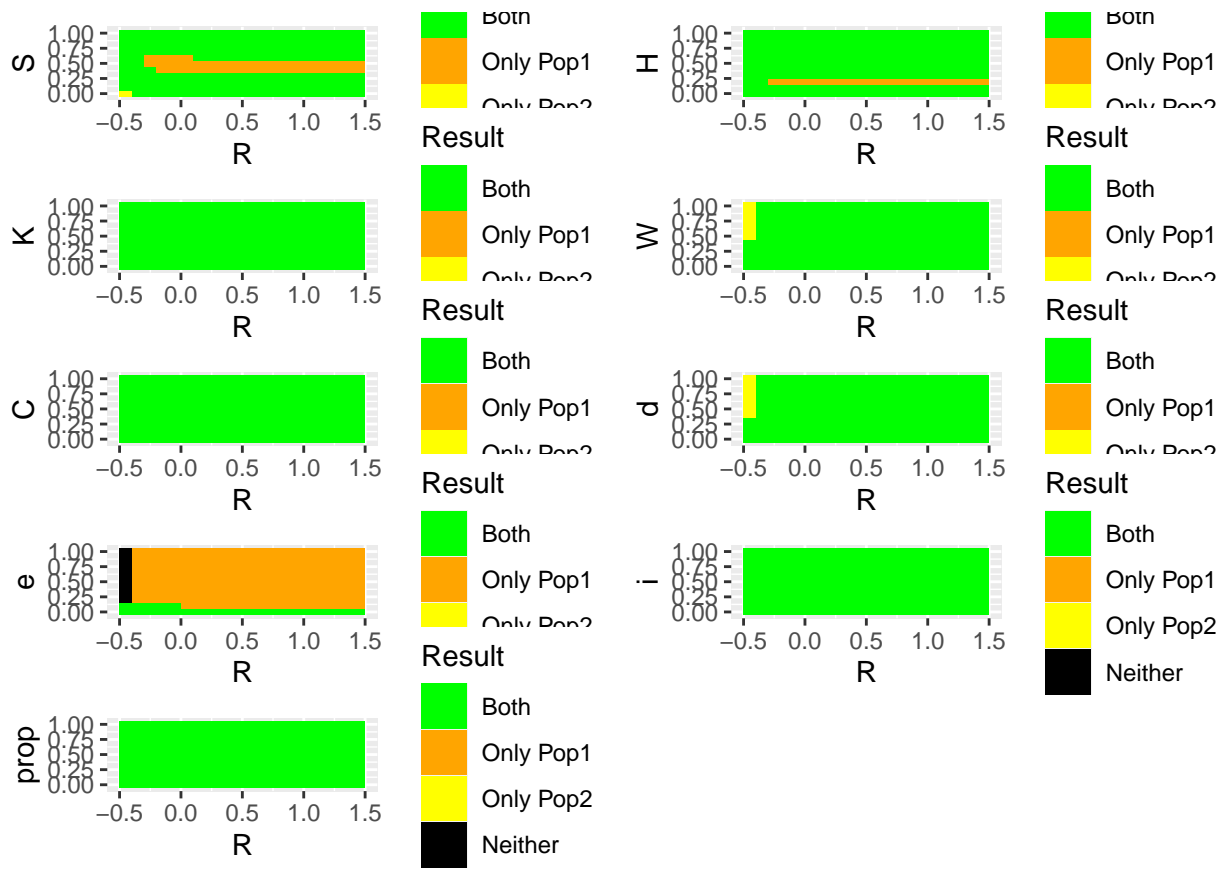


Figure 13: R parameter planes

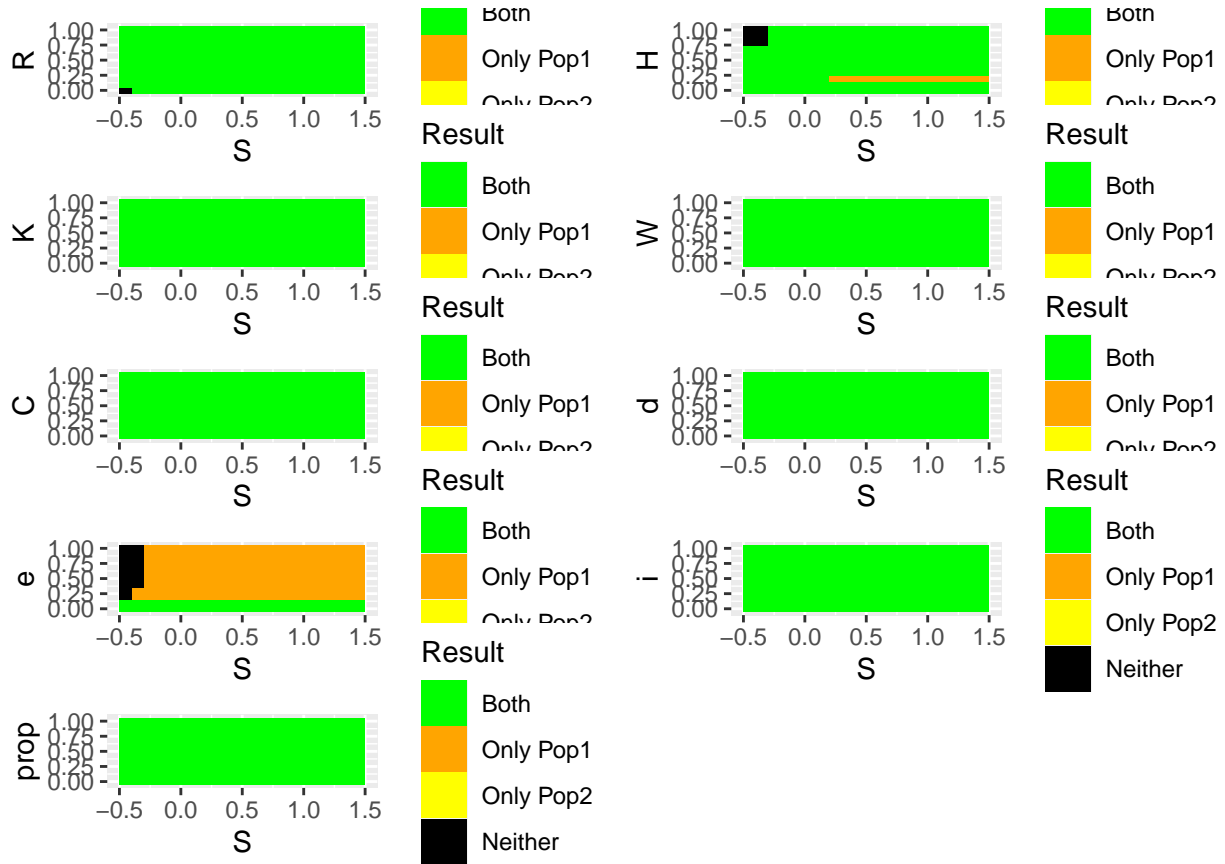


Figure 14: S parameter planes

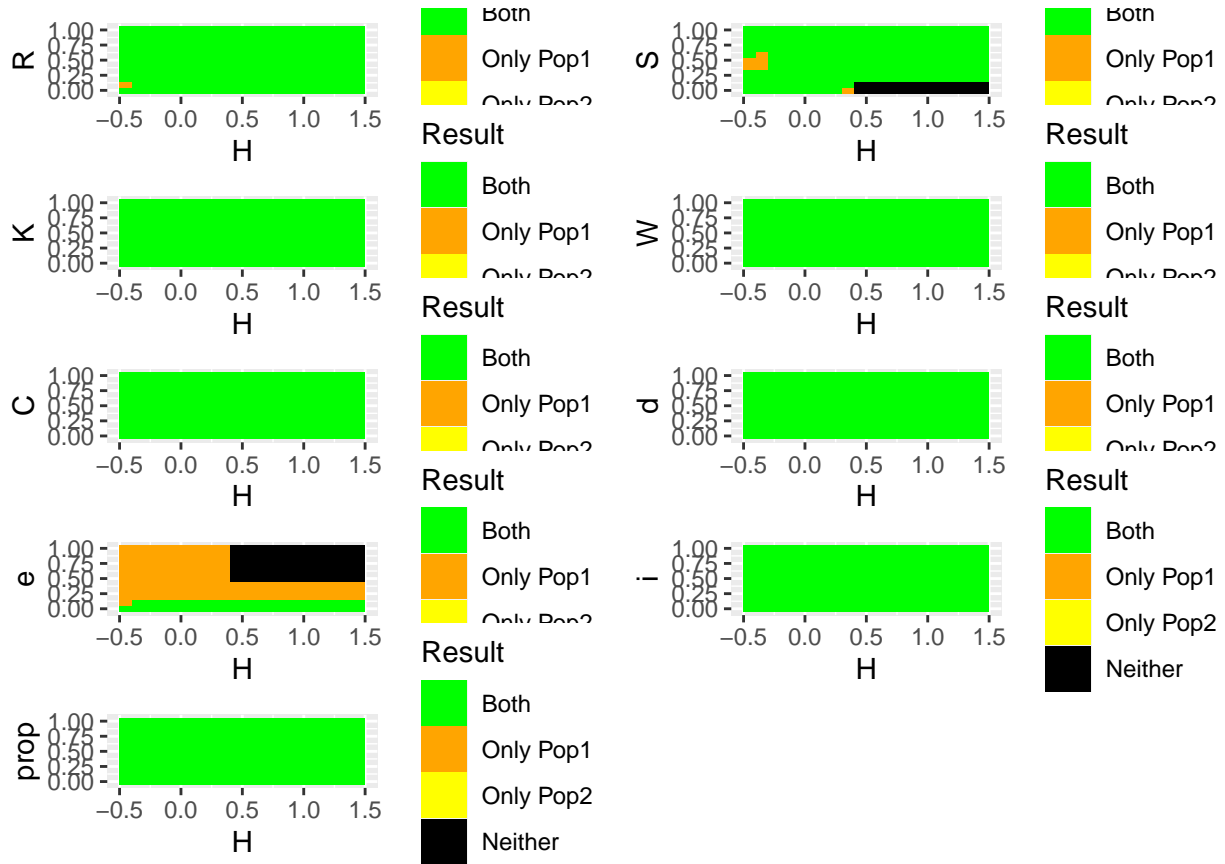


Figure 15: h parameter planes



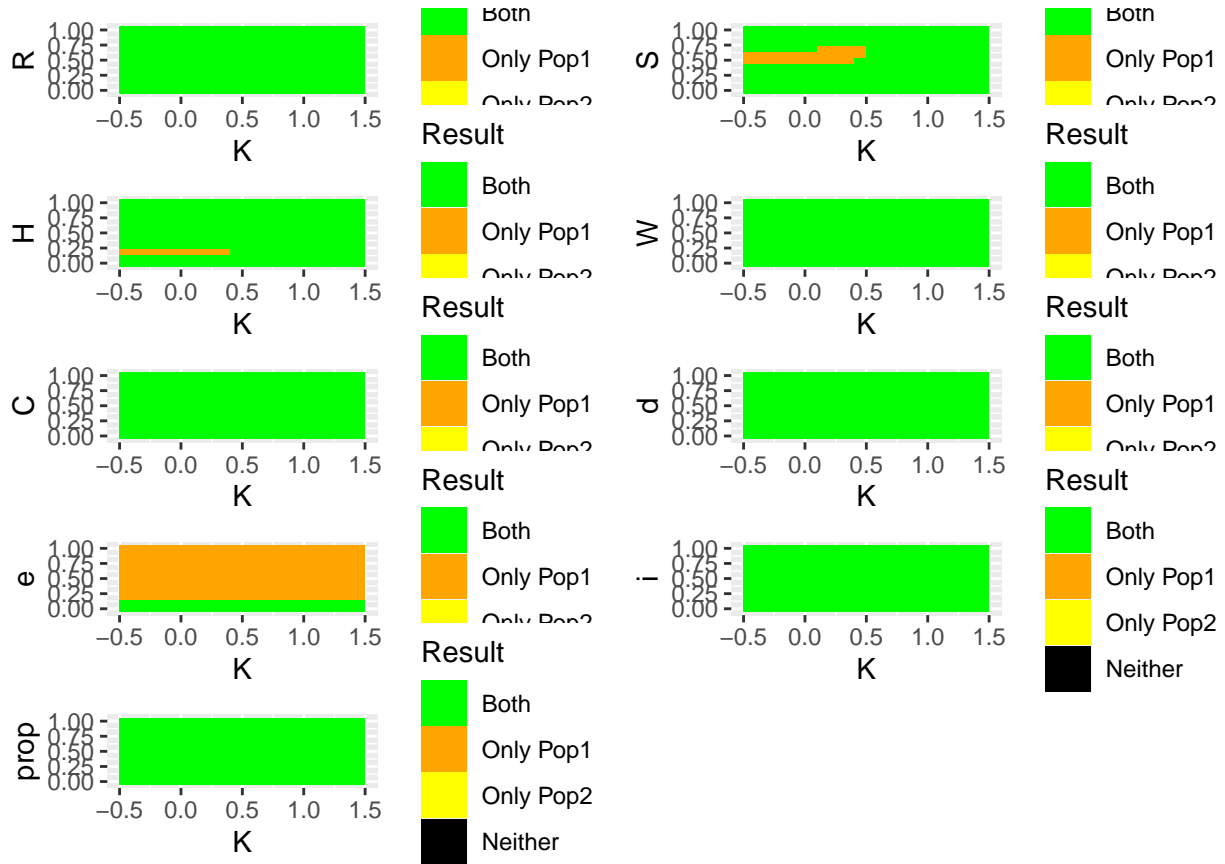


Figure 16: K parameter planes ranging from 0-1

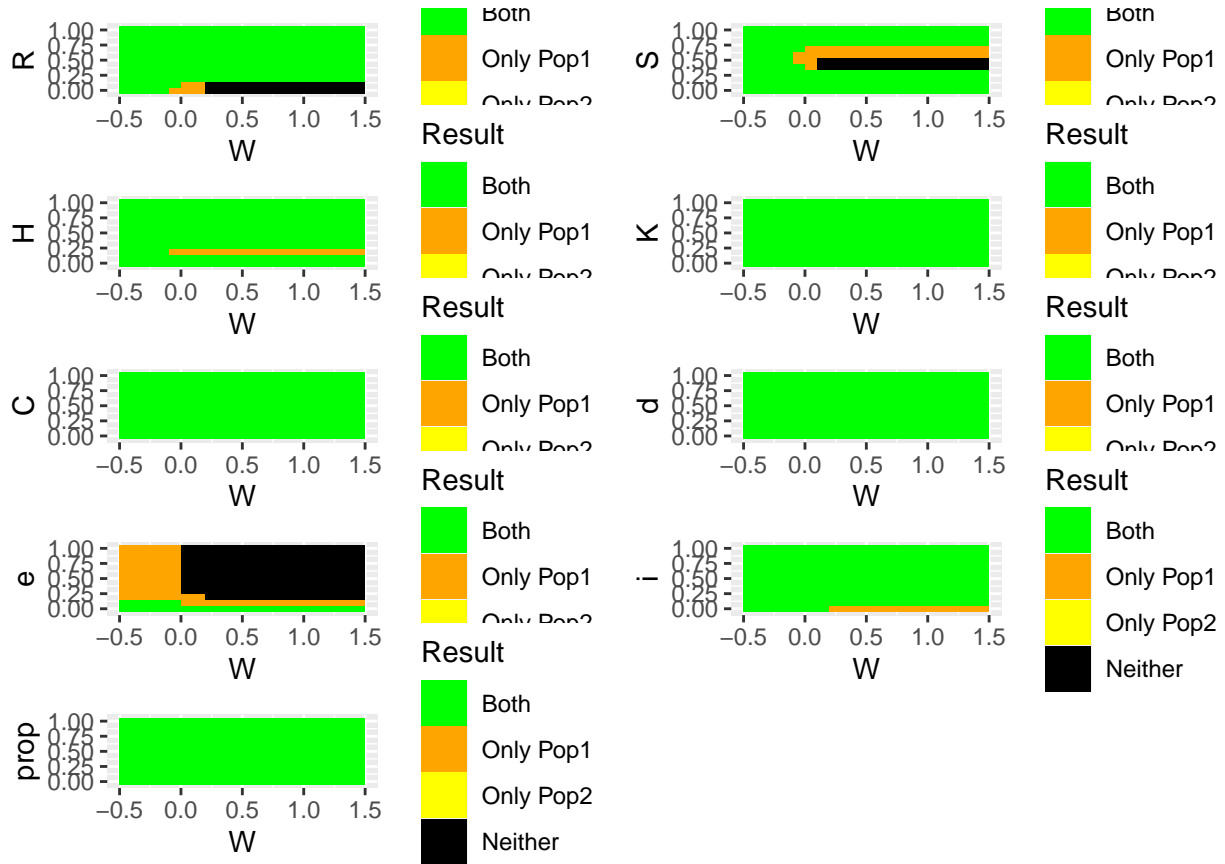


Figure 17:  $w$  parameter planes

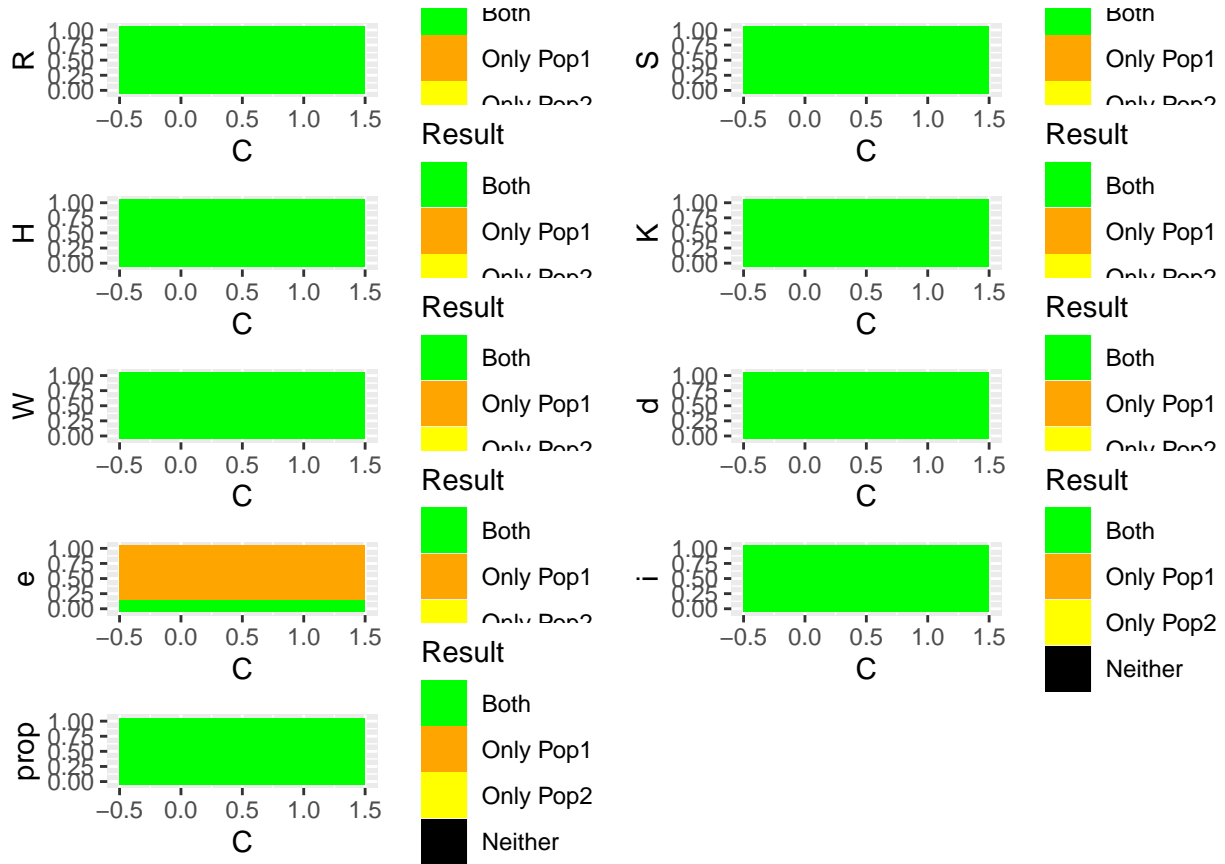


Figure 18: c parameter planes

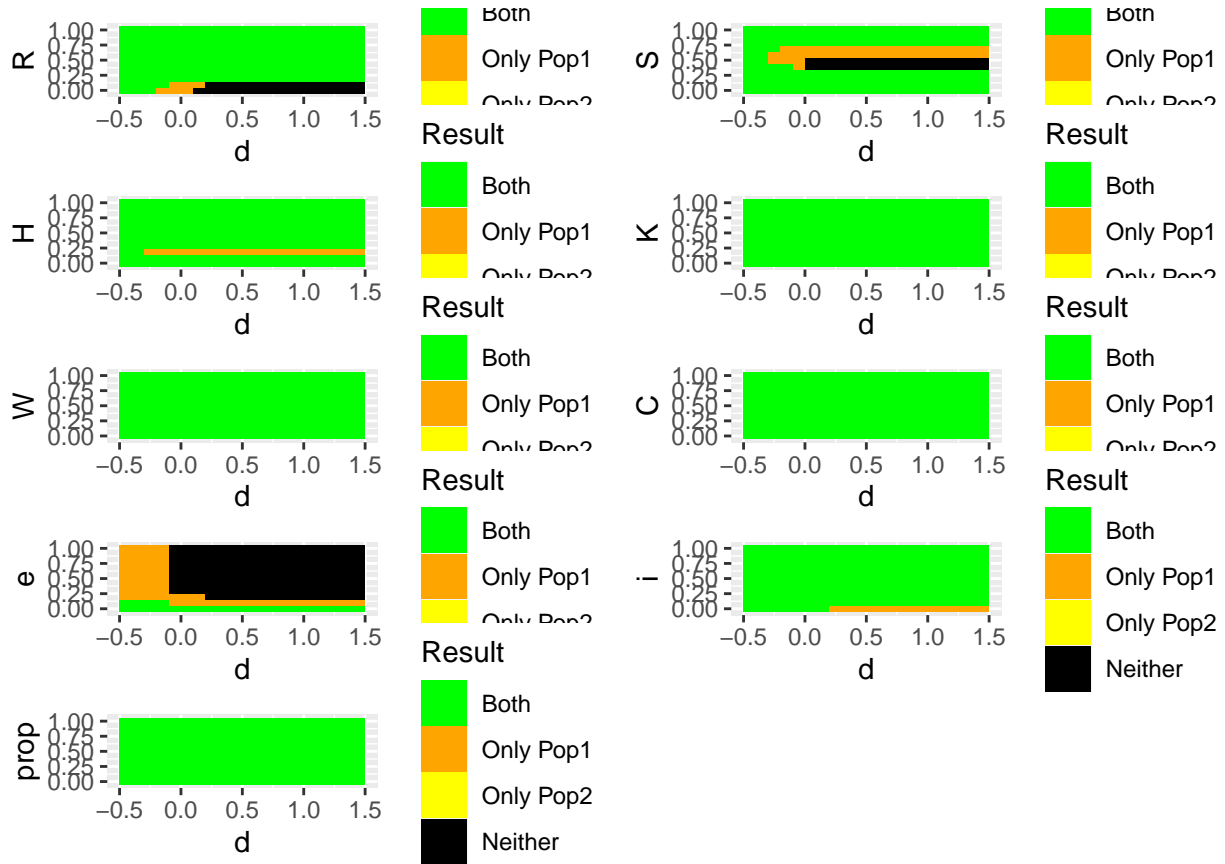


Figure 19:  $d$  parameter planes

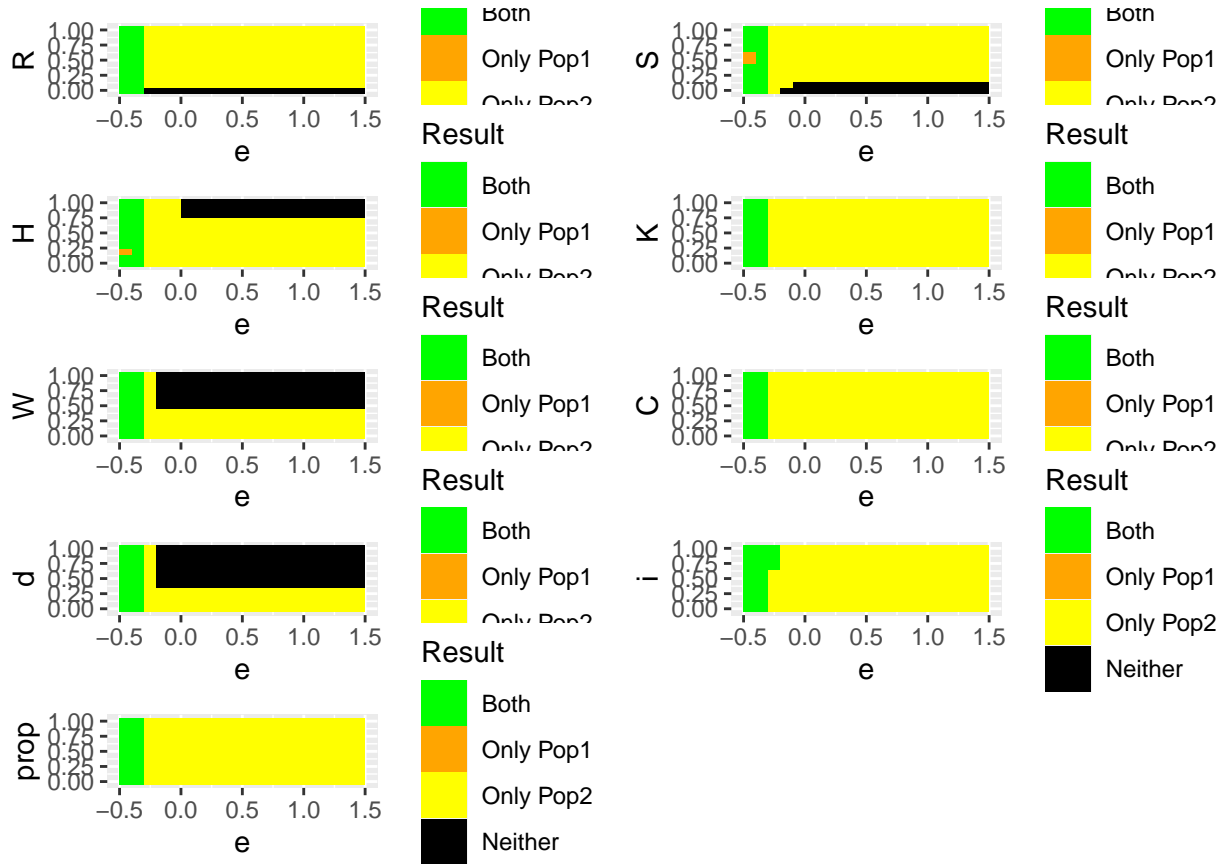


Figure 20:  $e$  parameter planes

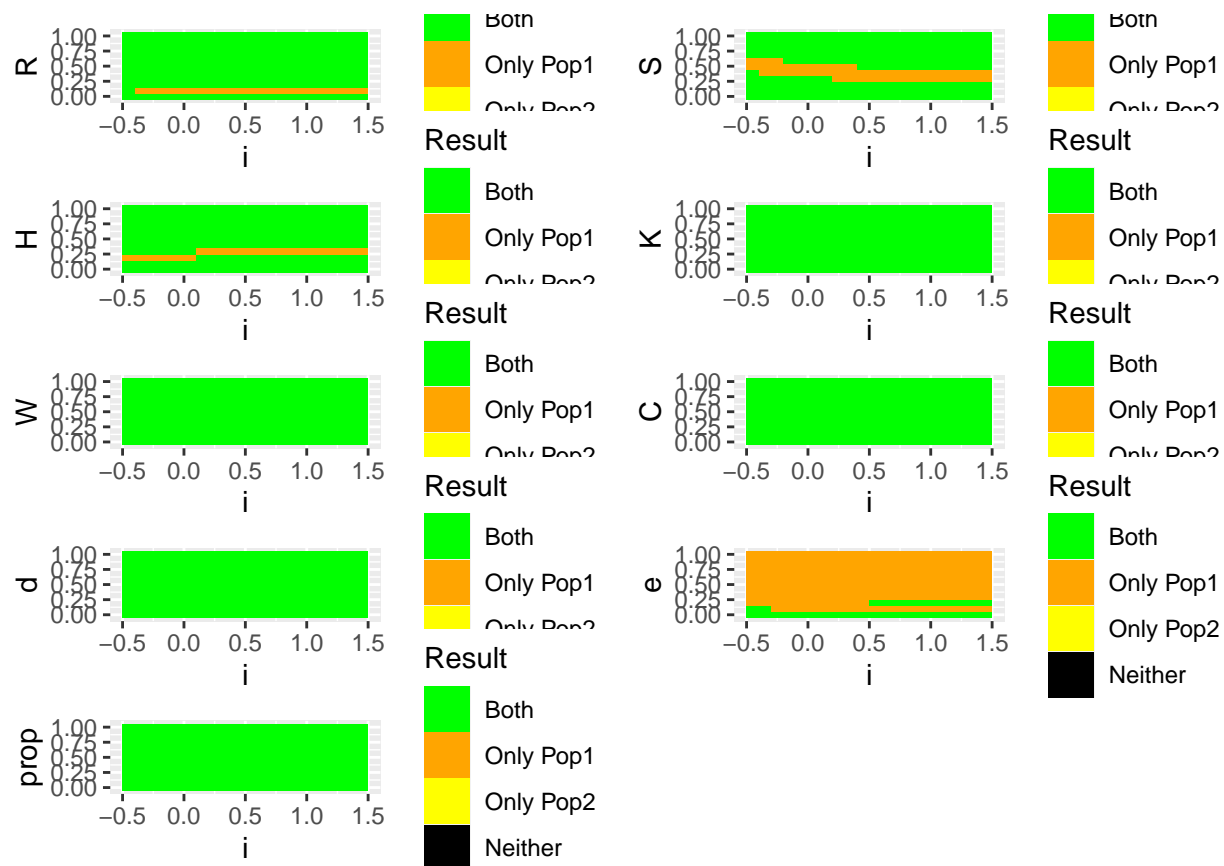


Figure 21:  $i$  parameter planes

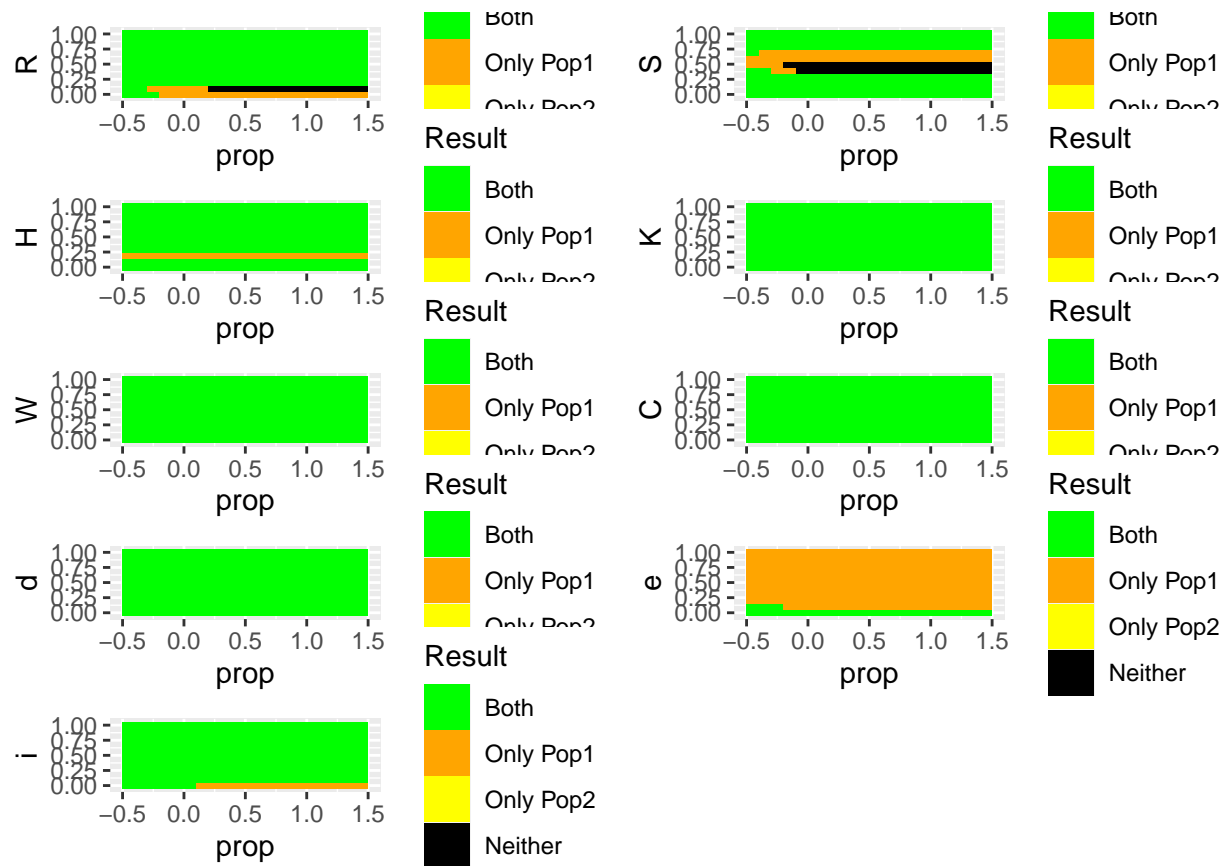


Figure 22: prop parameter planes

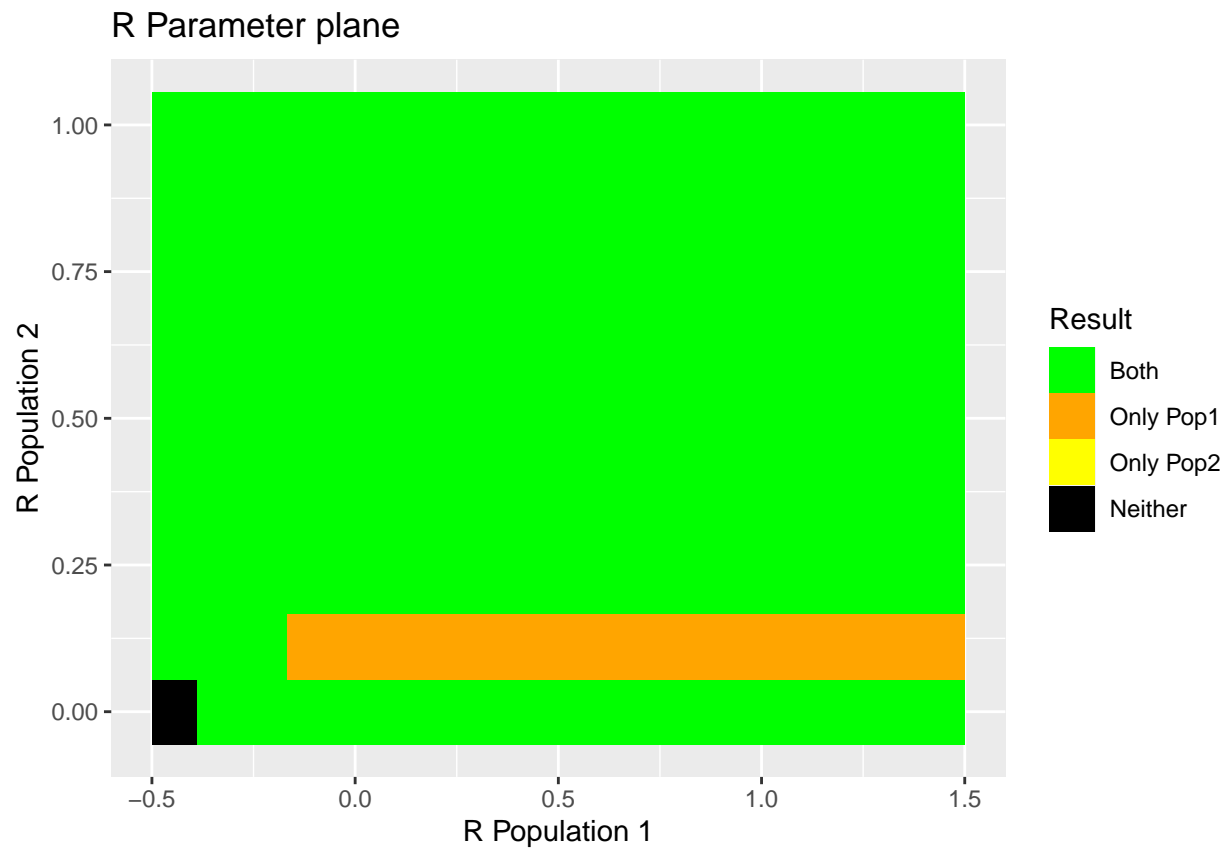


Figure 23: r population planes



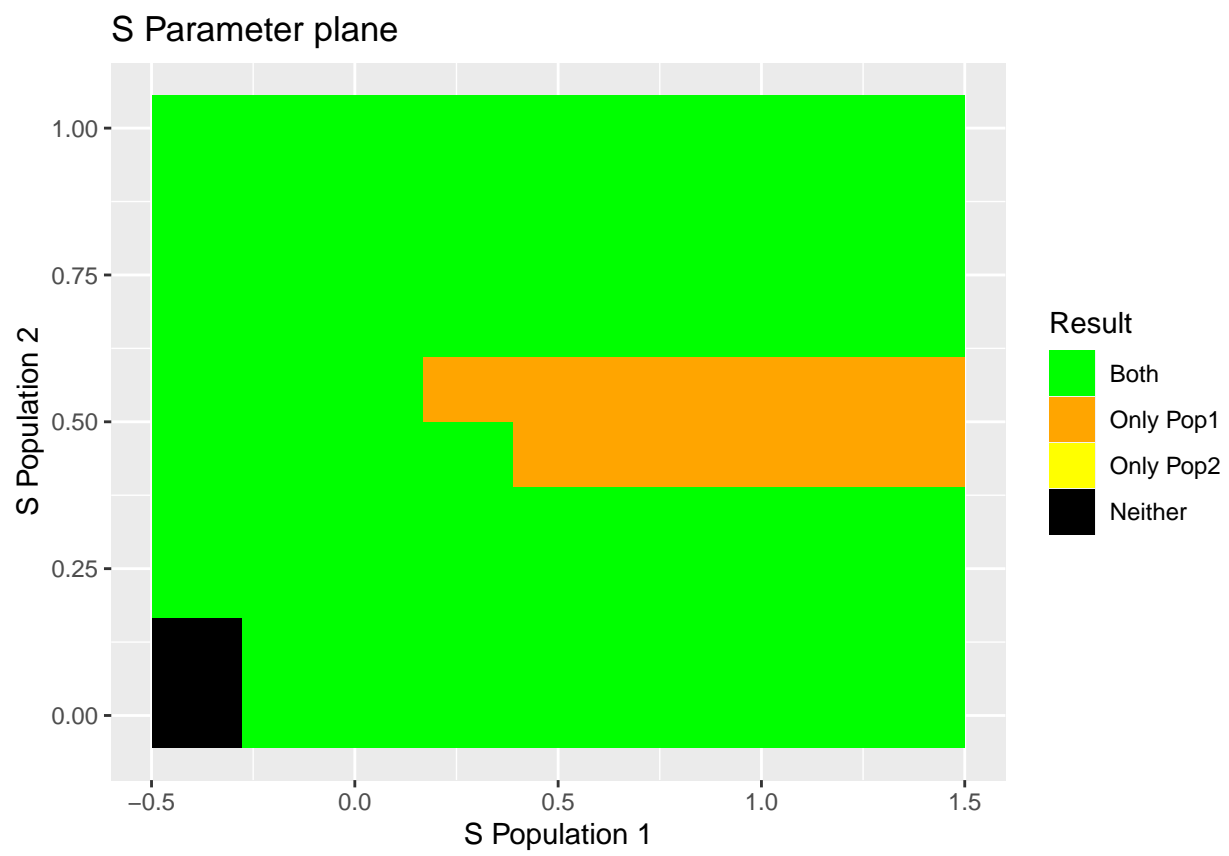


Figure 24: s population planes



Figure 25: h population planes

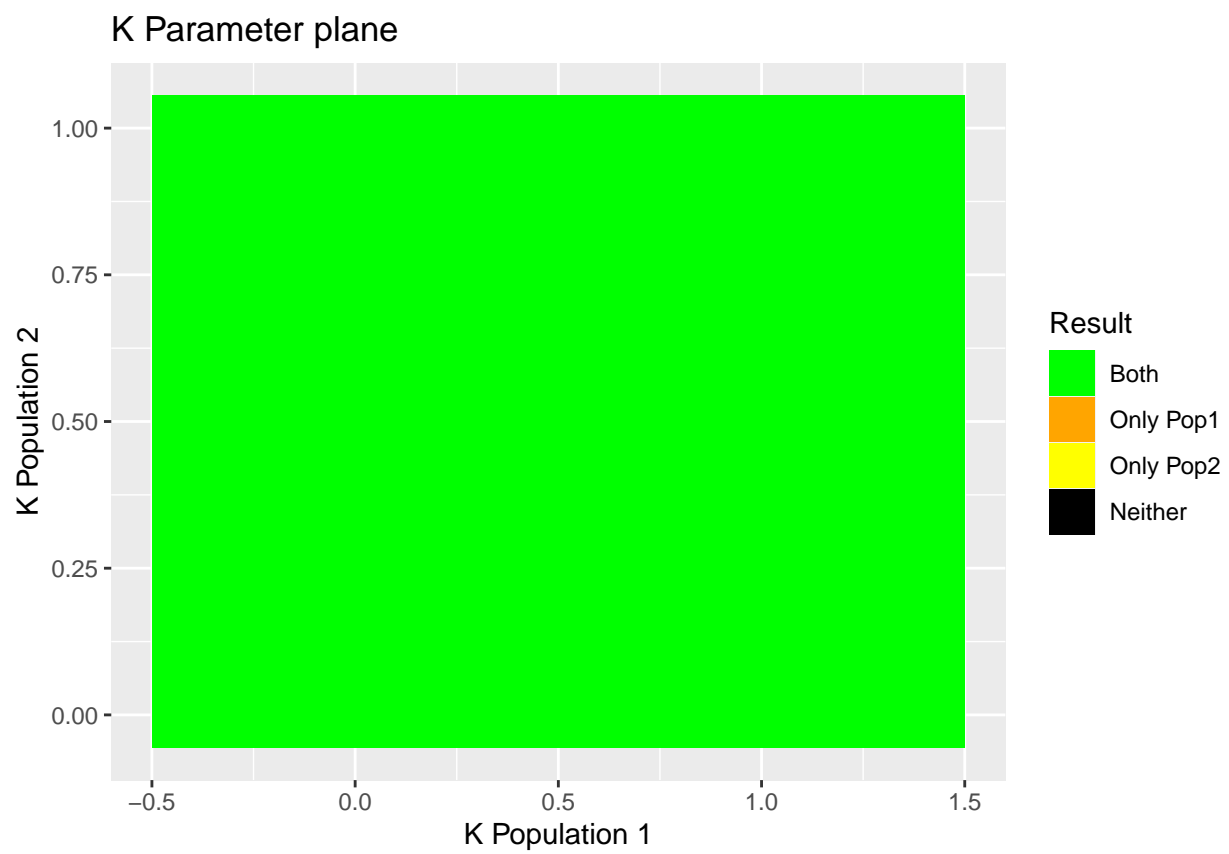


Figure 26: k population planes 0 to 1

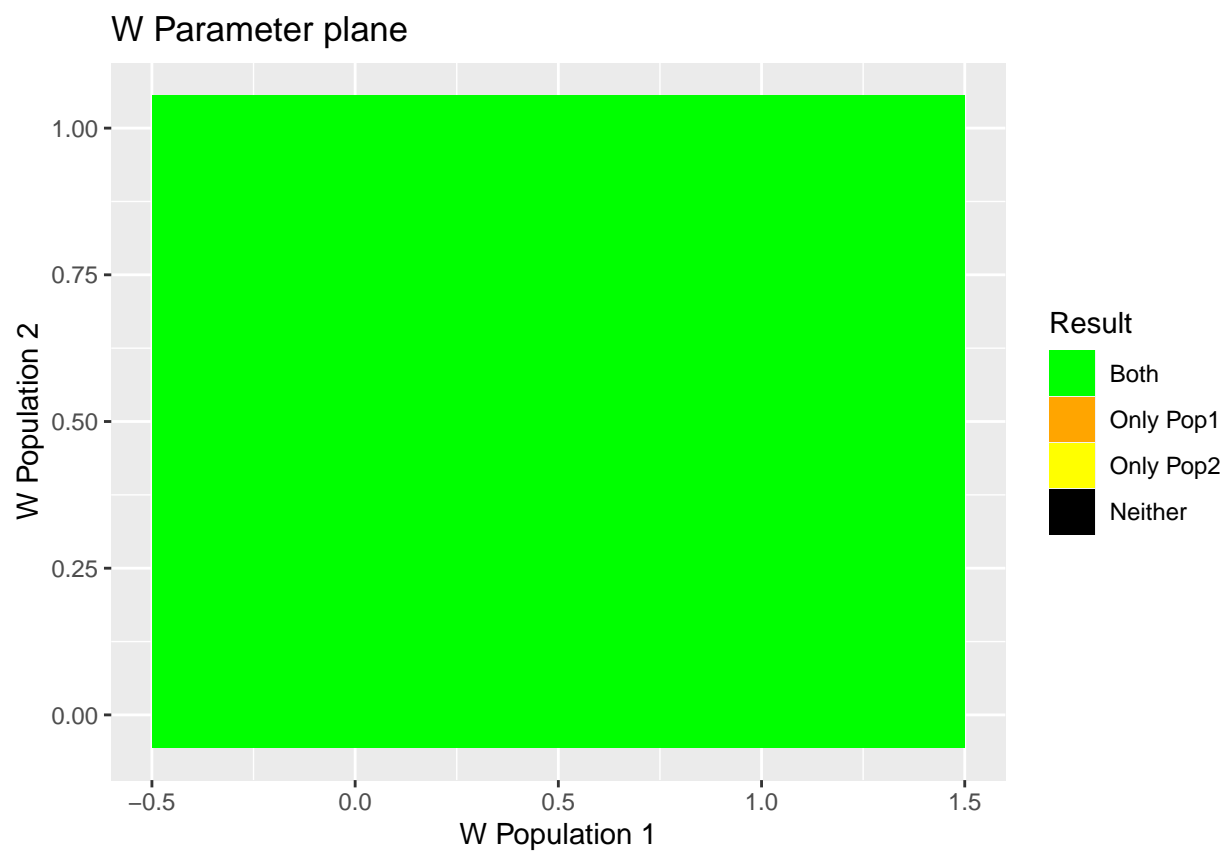


Figure 27: w population planes

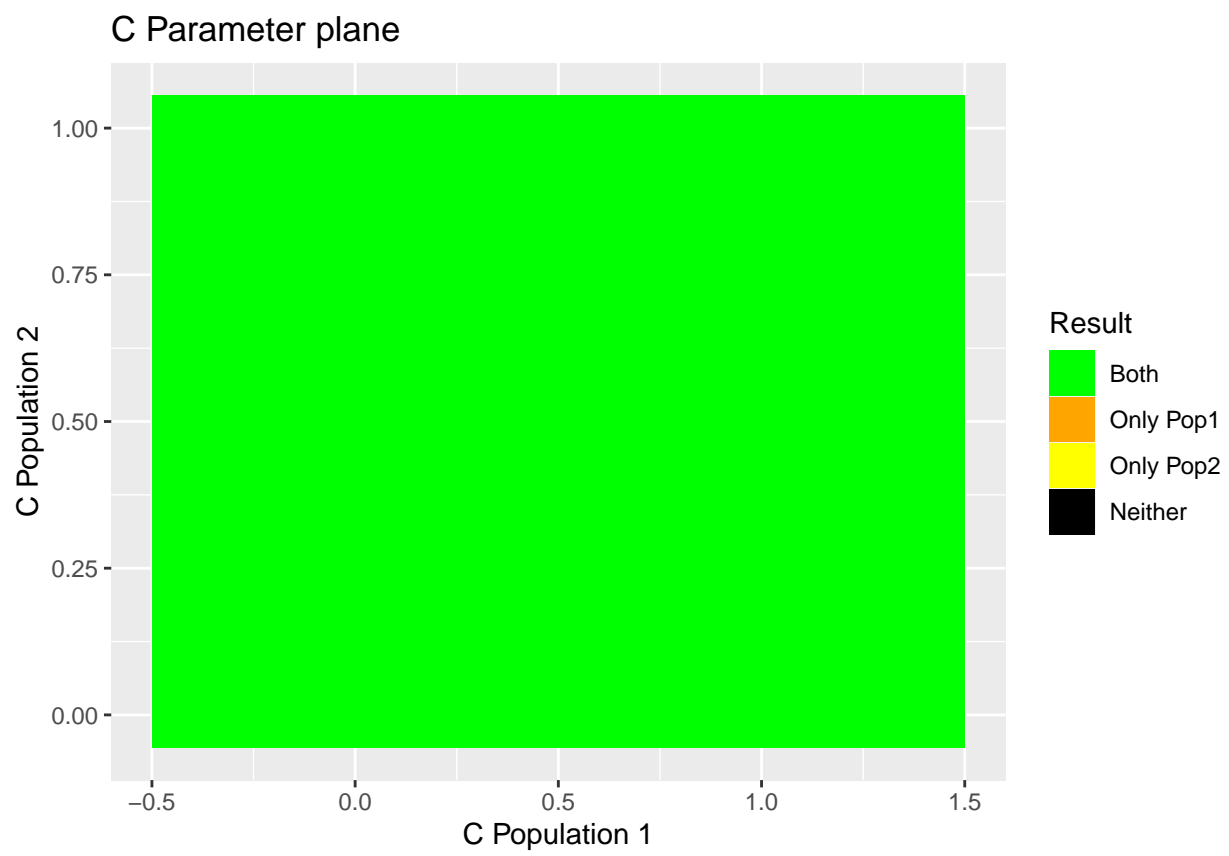


Figure 28: c population planes

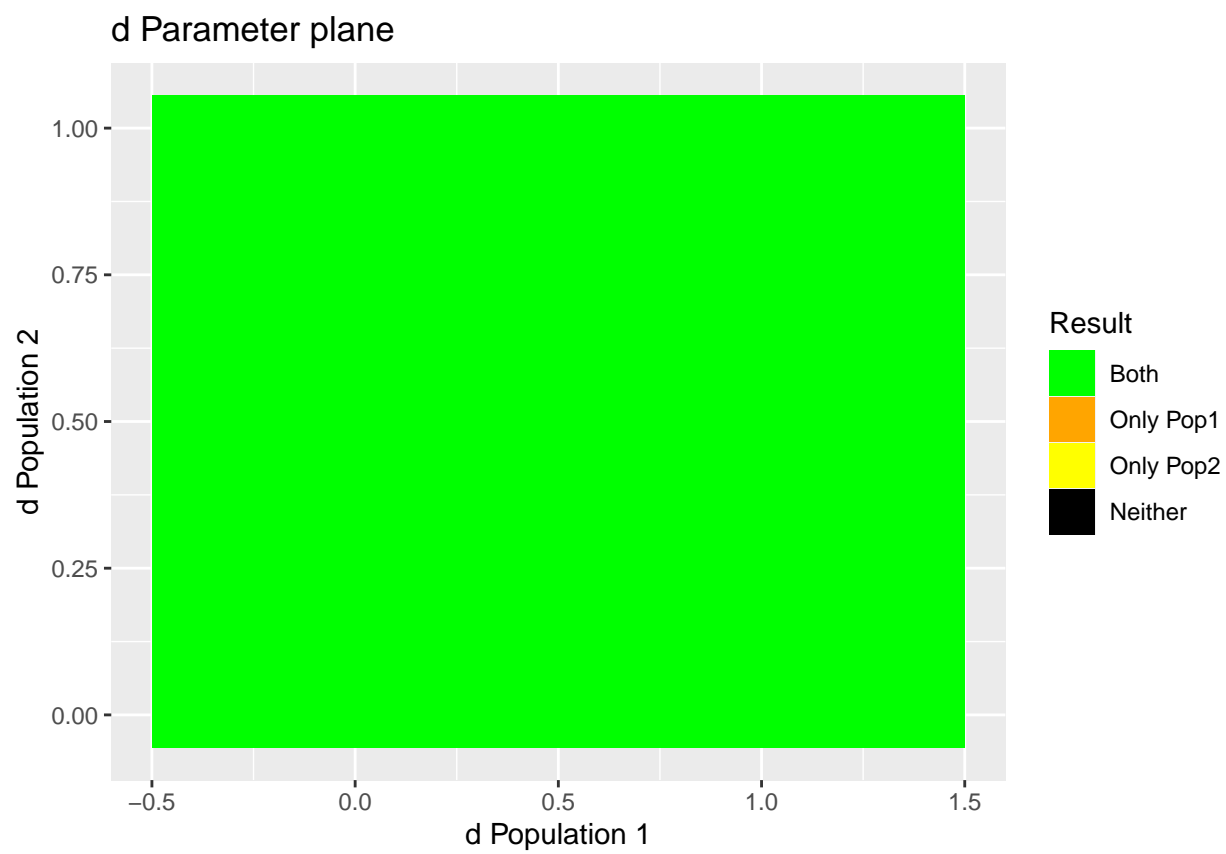


Figure 29: d population planes

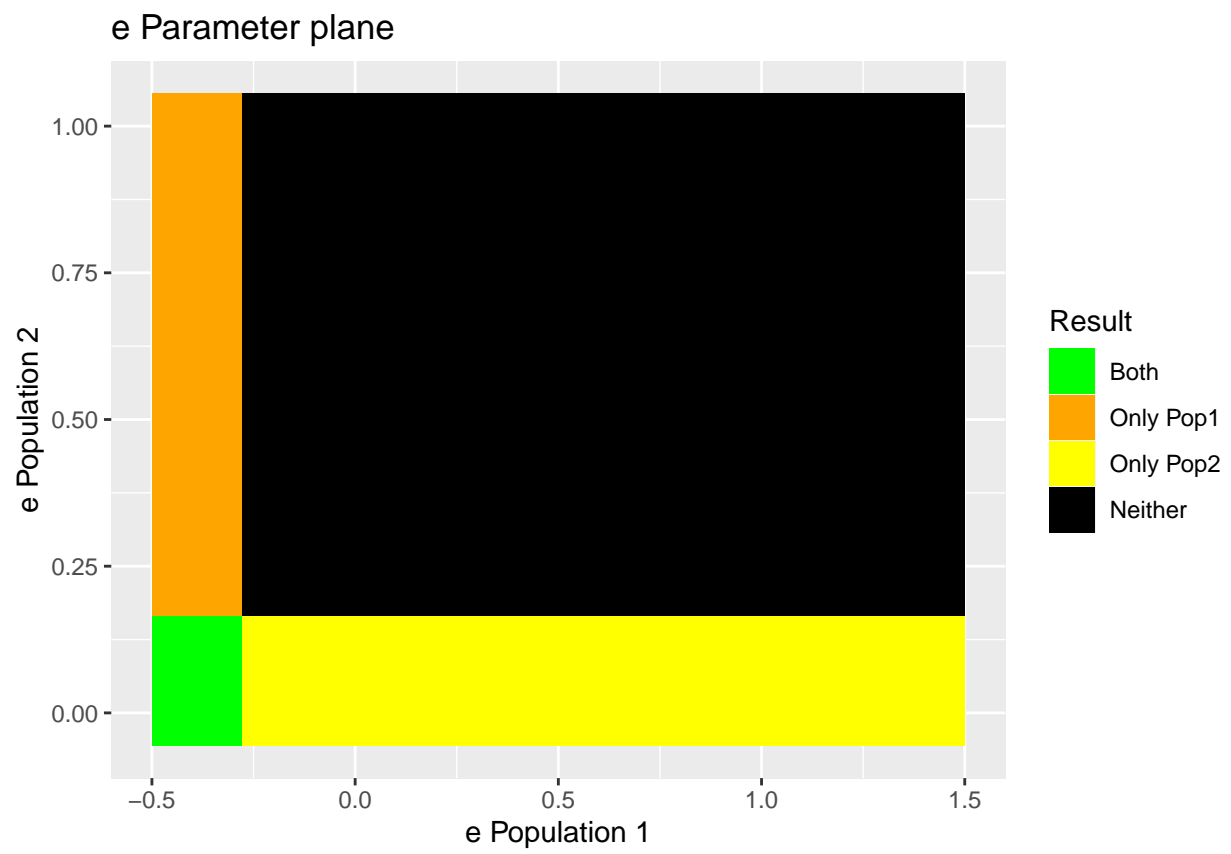


Figure 30: e population planes

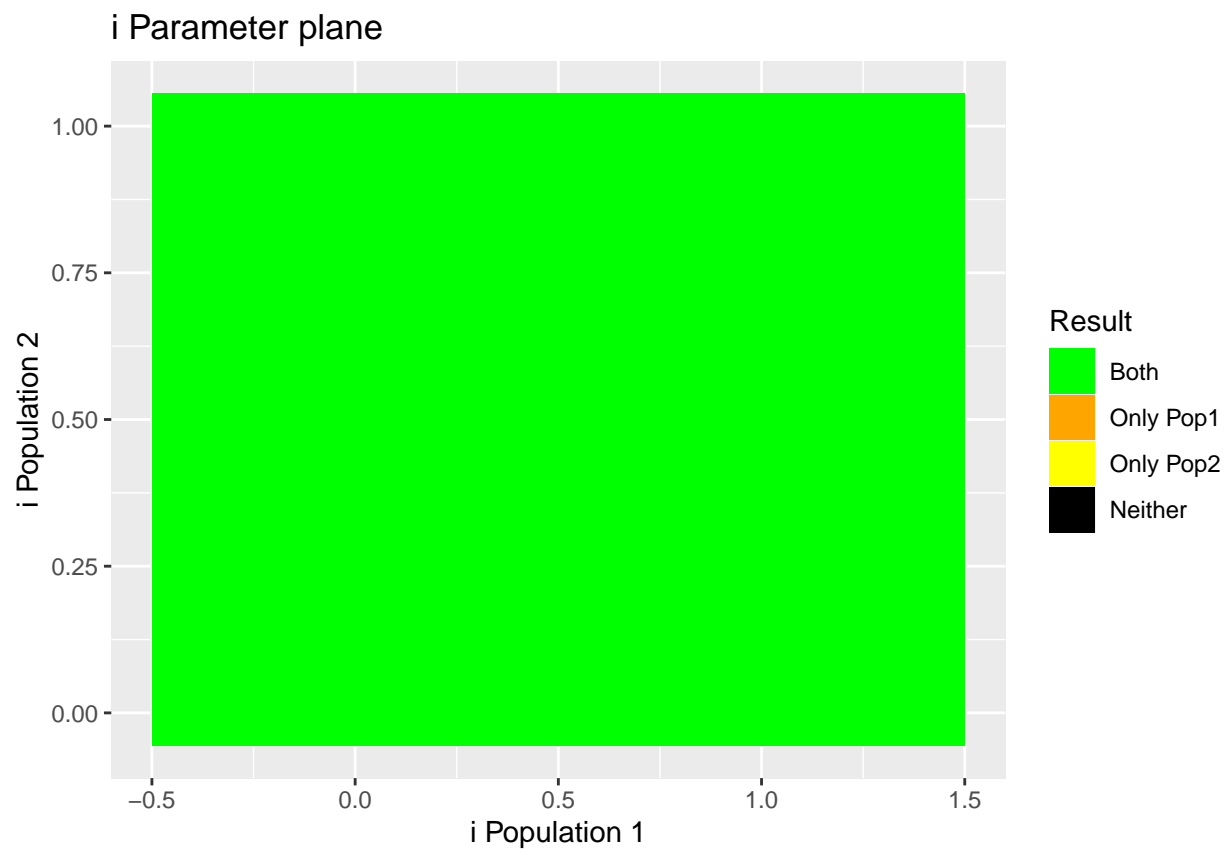


Figure 31: i population planes



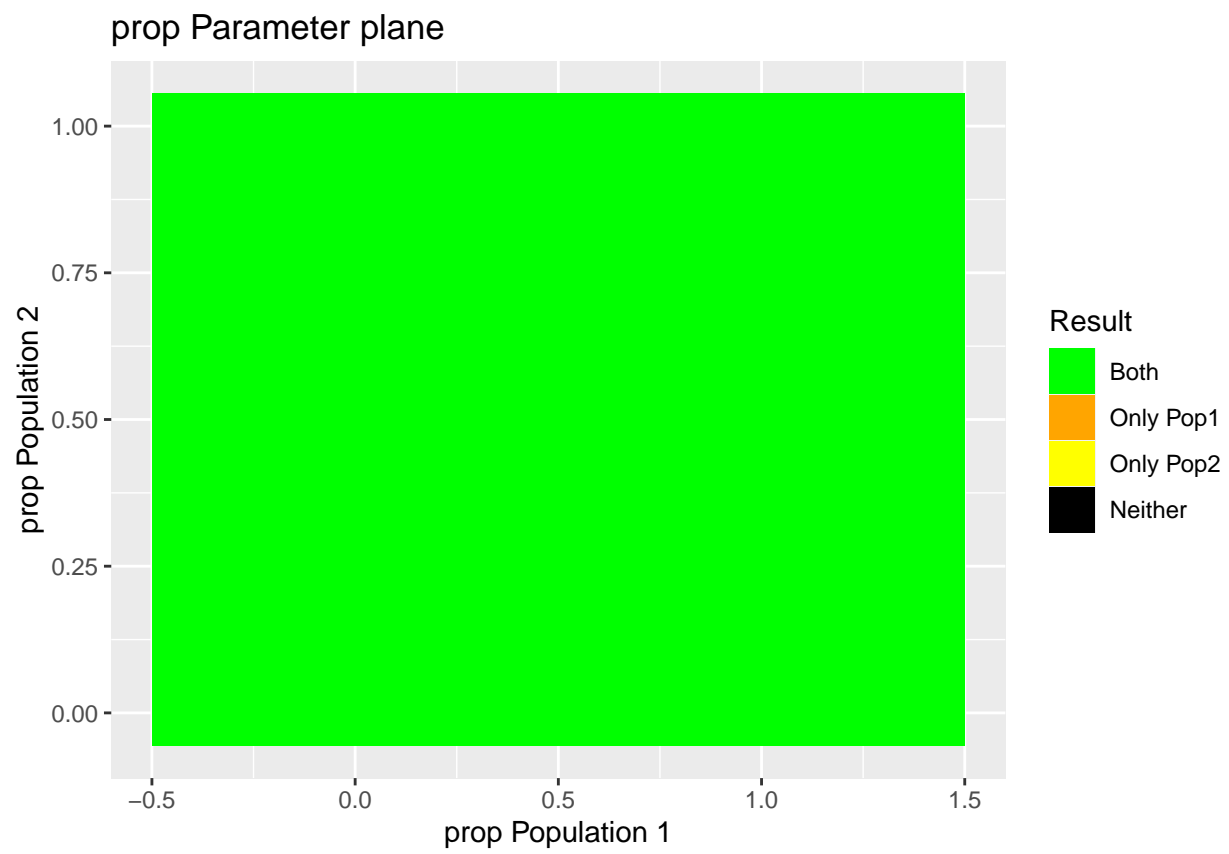


Figure 32: prop population planes