

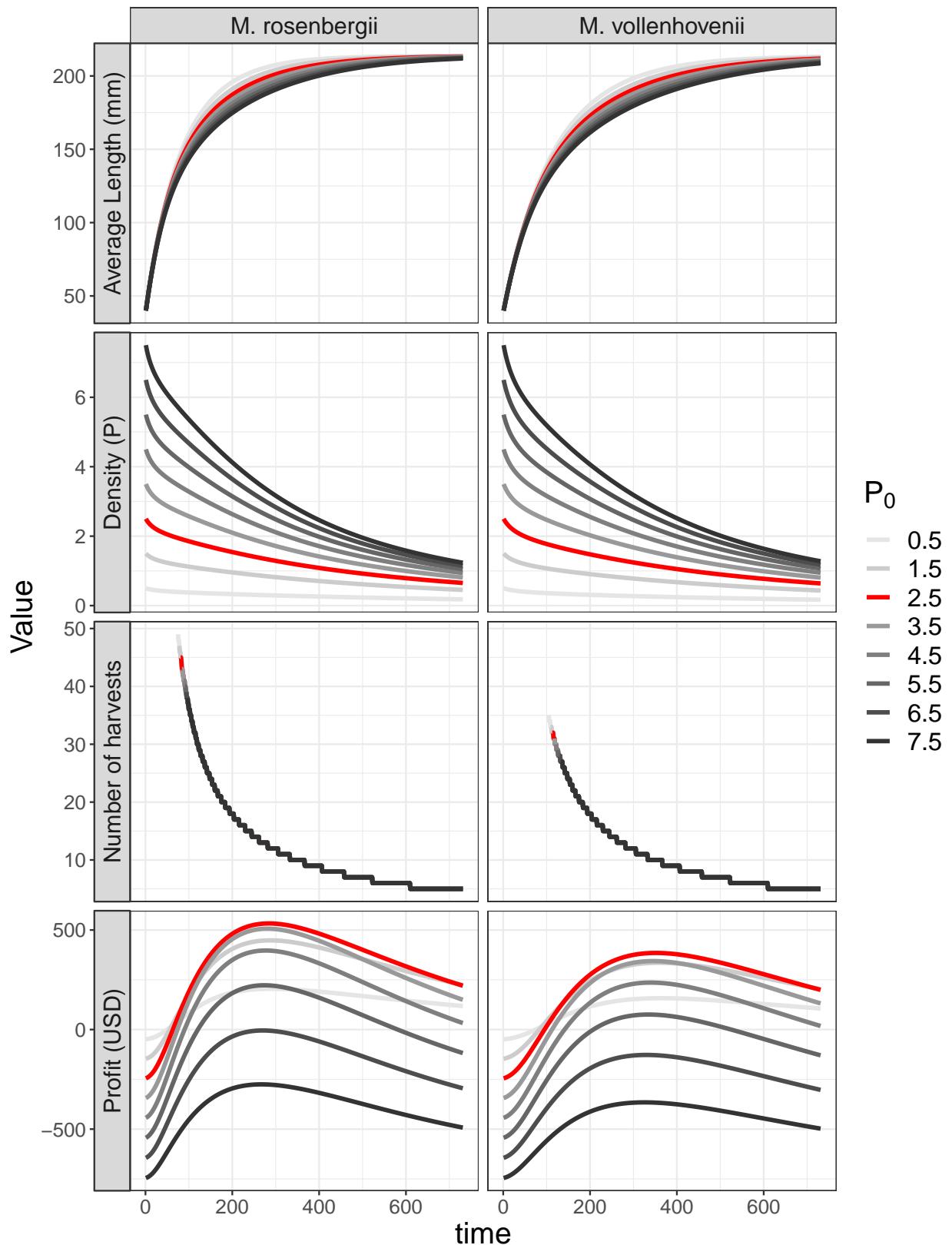
Full Analysis

Chris Hoover

August 22, 2018

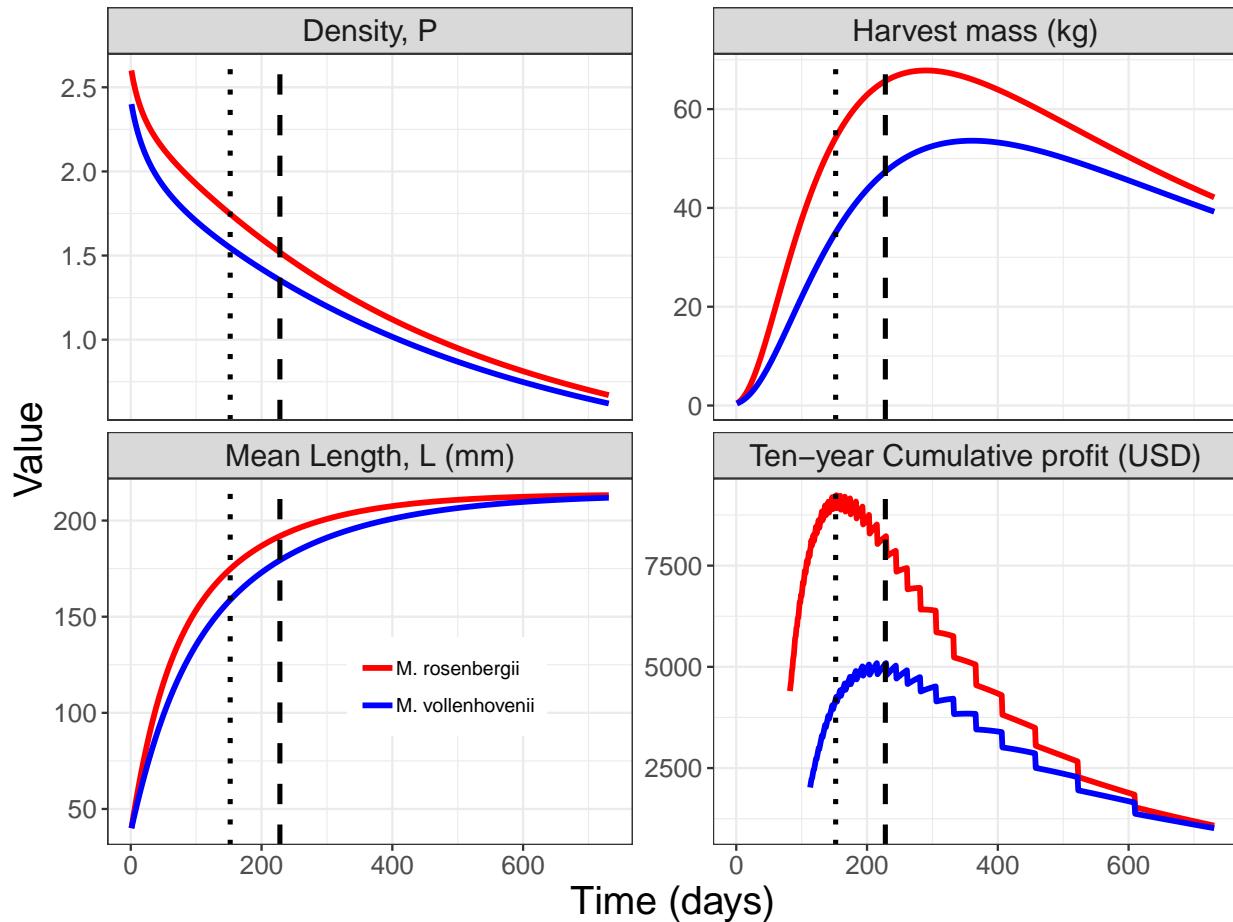
Numeric estimation of max profit

For each prawn species, shows trajectories of length, density, harvestable biomass, and profit over time over a range of stocking densities



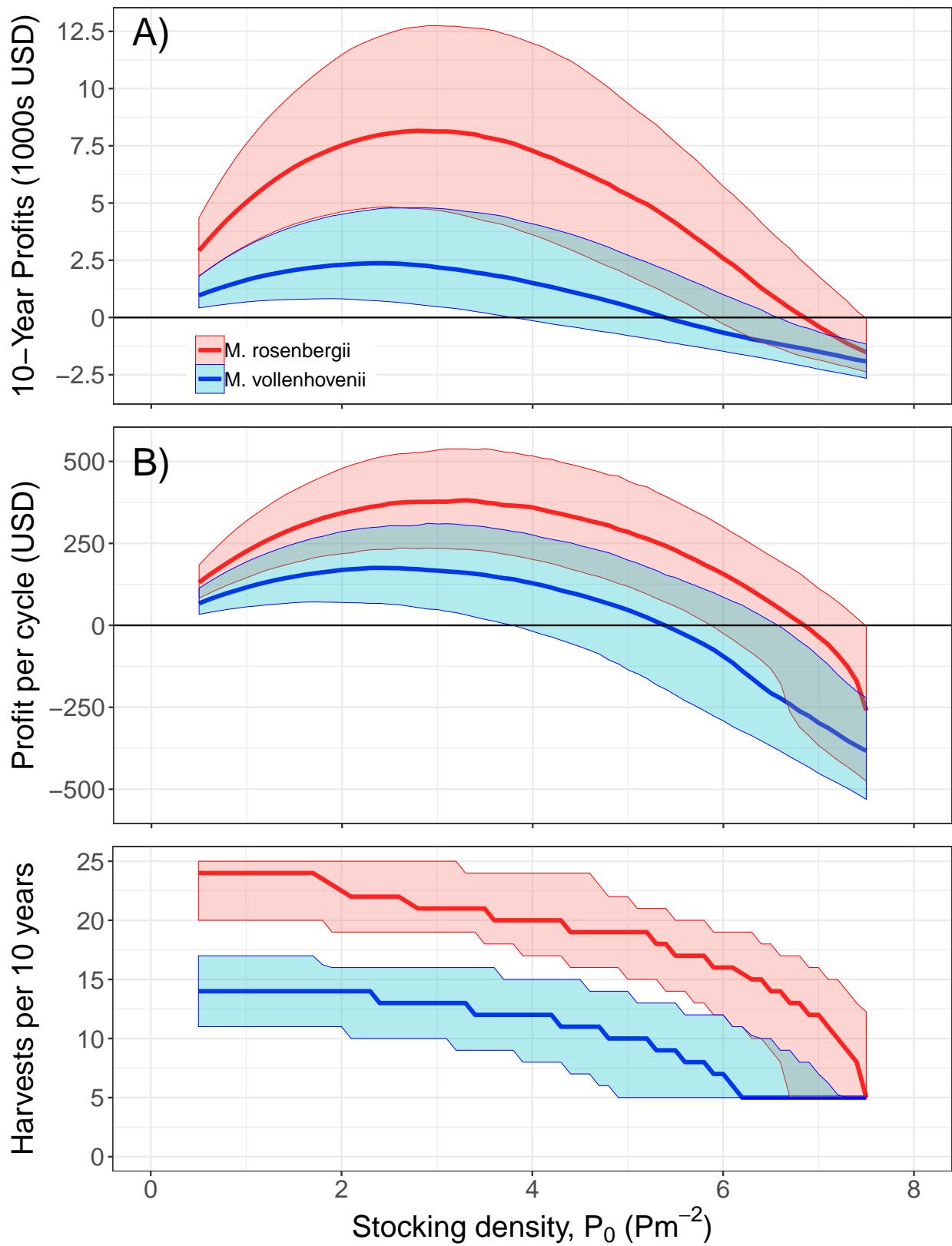
Example cycle

Figure showing prawn aquaculture dynamics through time



Eumetric curves

We want to add estimates of uncertainty to the eumetric curve in addition to the eumetric curve generated by point estimates of all parameters (above). We'll use the same parameter sets from the latin hypercube generated for the PRCC sensitivity analysis to run the model over all tested stocking densities



Optimal management table

Also want a table showing set of parameters and outputs from “optimal management”. Two approaches here: can either take uncertainty

Table 1: Estimates of *M. vollenhovenii* optimal management (uncertainty during optimization)

P_nought	2300
Cum_profit_med	2374.808
harvest_time_sum	260 (228 - 365)
harvest_mass_sum	22.91 (16.11 - 30.52)
harvest_length_sum	169.62 (162.45 - 177.62)
harvest_number_sum	815.23 (591.61 - 1036.37)
profit_cycle_sum	170.36 (55.89 - 311.42)
roi_sum	0.93 (0.33 - 1.8)
n_harvest_sum	14 (10 - 16)
cum_profit_sum	2374.81 (640.69 - 5117.8)

Table 2: Estimates of *M. vollenhovenii* optimal management (uncertainty during optimization)

P_nought	2900
Cum_profit_med	8218.367
harvest_time_sum	173 (146 - 192)
harvest_mass_sum	38.39 (30.74 - 46.95)
harvest_length_sum	167.66 (161.02 - 175.09)
harvest_number_sum	1505.14 (1315 - 1702.93)
profit_cycle_sum	371.89 (232.09 - 540.08)
roi_sum	1.63 (0.97 - 2.46)
n_harvest_sum	21 (19 - 25)
cum_profit_sum	8218.37 (4802.95 - 12645.21)

Table 3: Estimates of *M. vollenhovenii* optimal management (parametric uncertainty)

P_nought	2400
L_nought	40
harvest_time_med	280 (228 - 365)
harvest_mass_med	23.57 (16.59 - 31.36)
harvest_length_med	169.82 (162.42 - 177.77)
harvest_number_med	846.26 (611.96 - 1074.91)
profit_cycle_med	171.19 (54.07 - 315.4)
roi_med	0.89 (0.3 - 1.75)
n_harvest_med	13 (10 - 16)
cum_profit_med	2369.91 (618.51 - 5157.65)

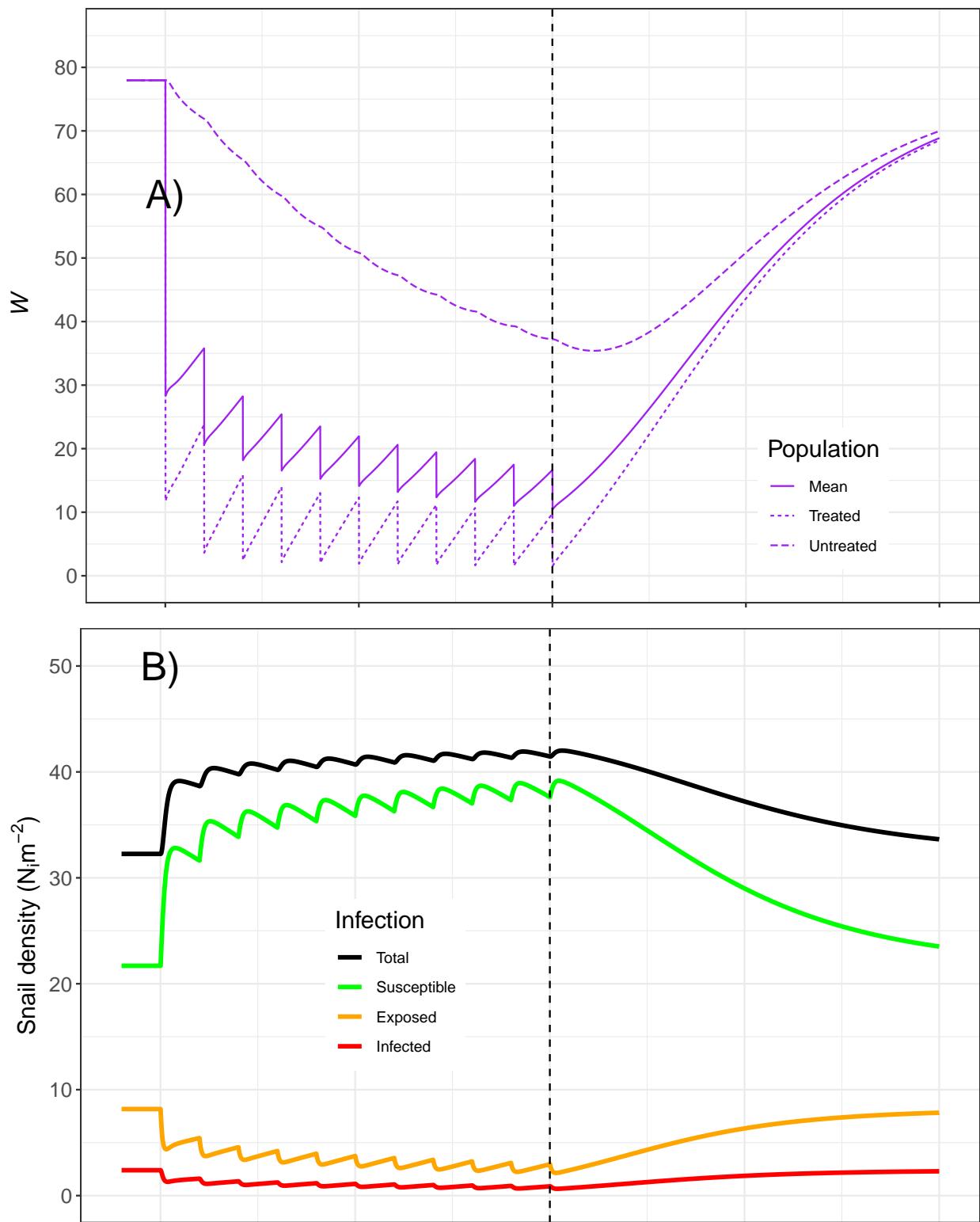
Table 4: Estimates of *M. rosenbergii* optimal management (parametric uncertainty)

P_nought	2600
L_nought	40
harvest_time_med	165 (146 - 192)
harvest_mass_med	36.37 (29.3 - 44.94)
harvest_length_med	168.06 (160.86 - 175.34)
harvest_number_med	1365.39 (1198.27 - 1543.09)
profit_cycle_med	366.46 (232.58 - 528.41)
roi_med	1.8 (1.08 - 2.69)
n_harvest_med	22 (19 - 25)
cum_profit_med	8171.43 (4821.01 - 12459.85)

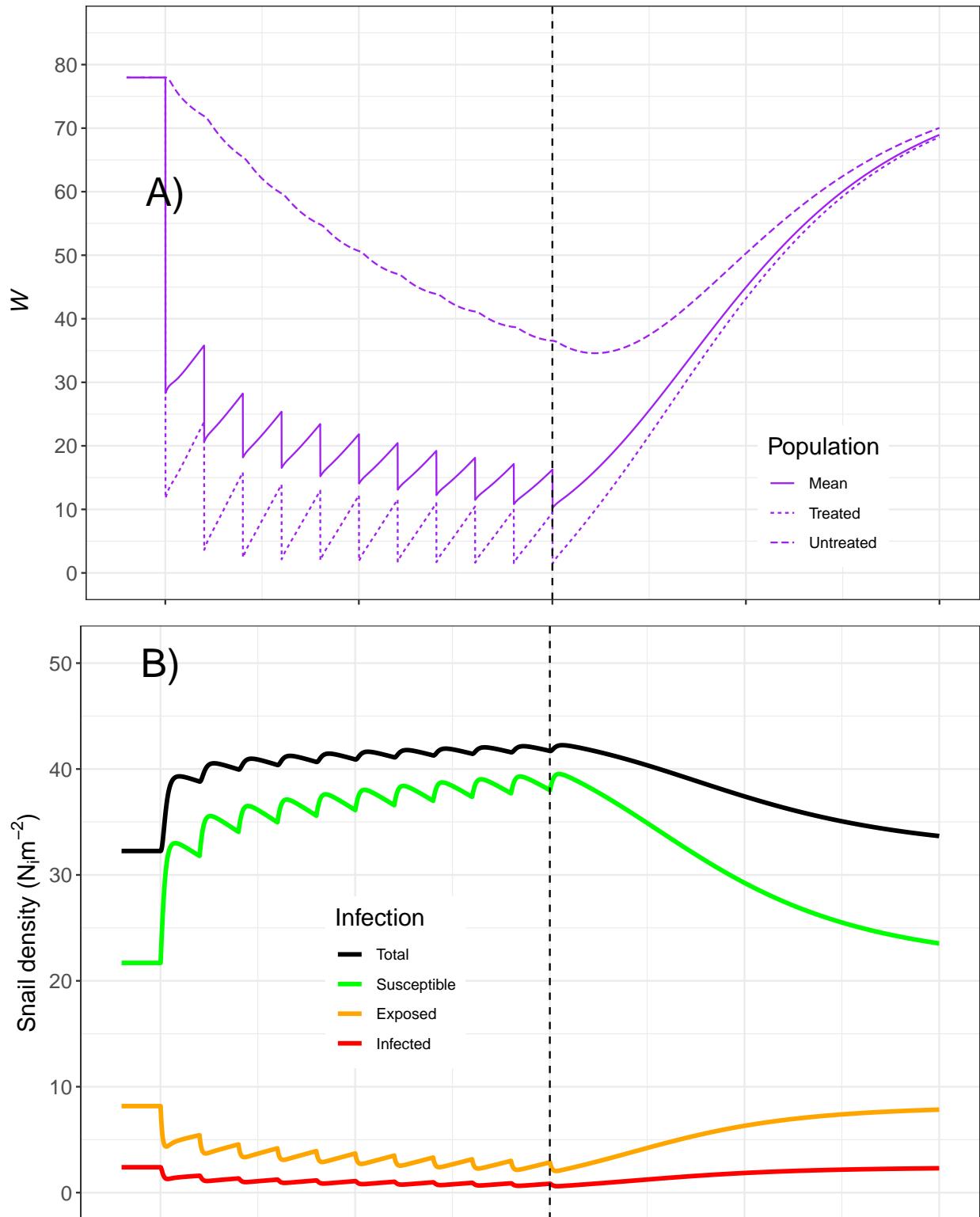
Epi simulations

MDA Intervention

With migration



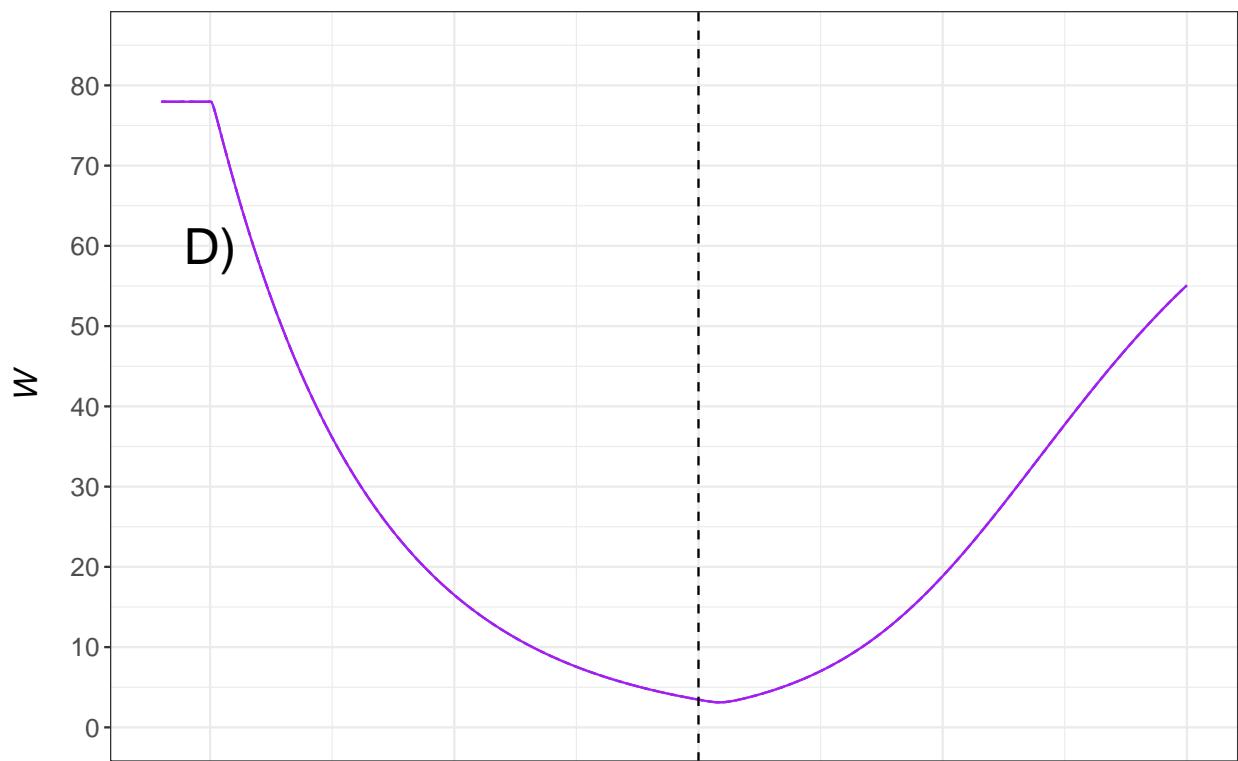
No migration

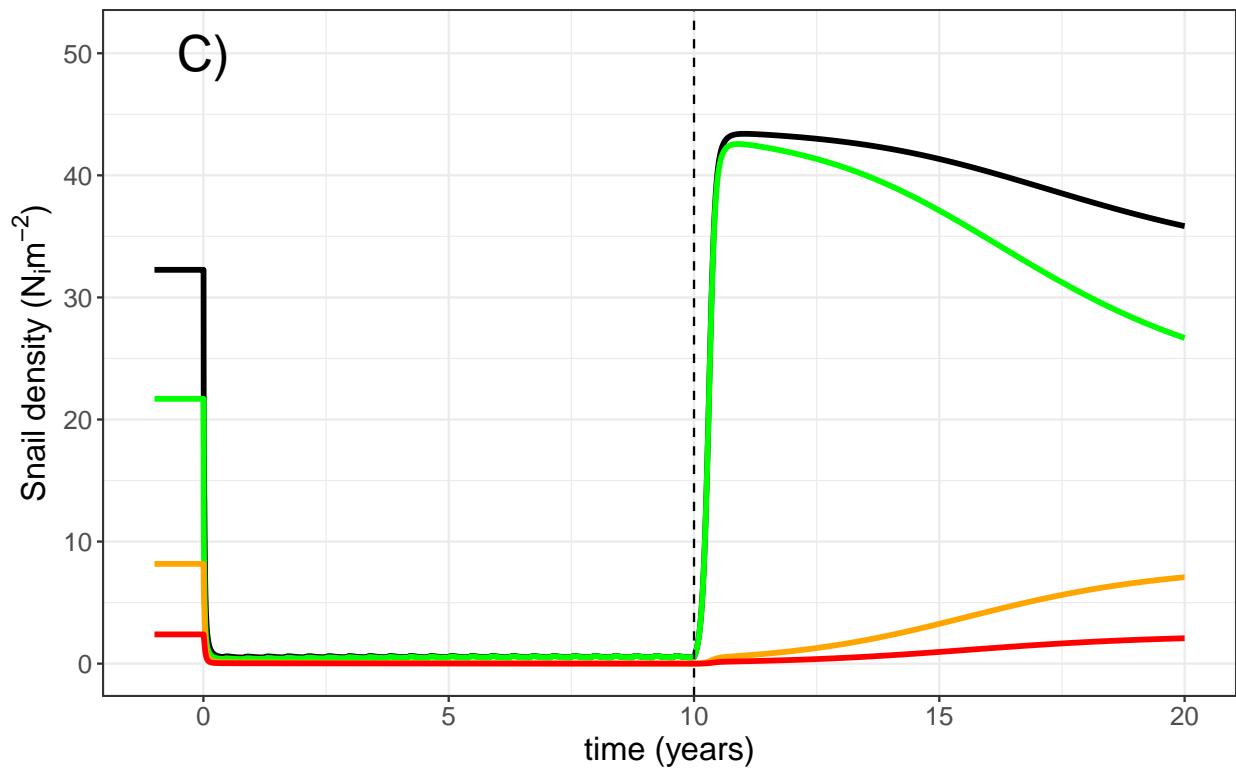


Prawn-only Intervention

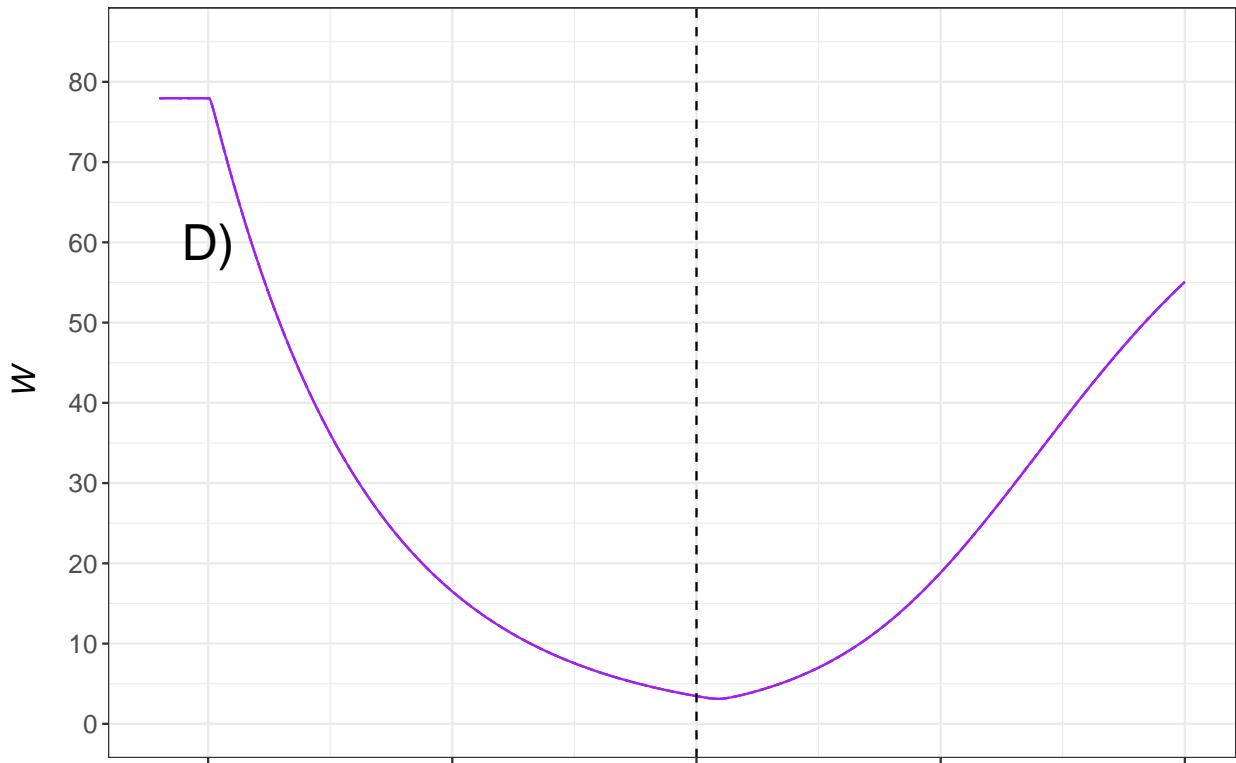
M. rosenbergii

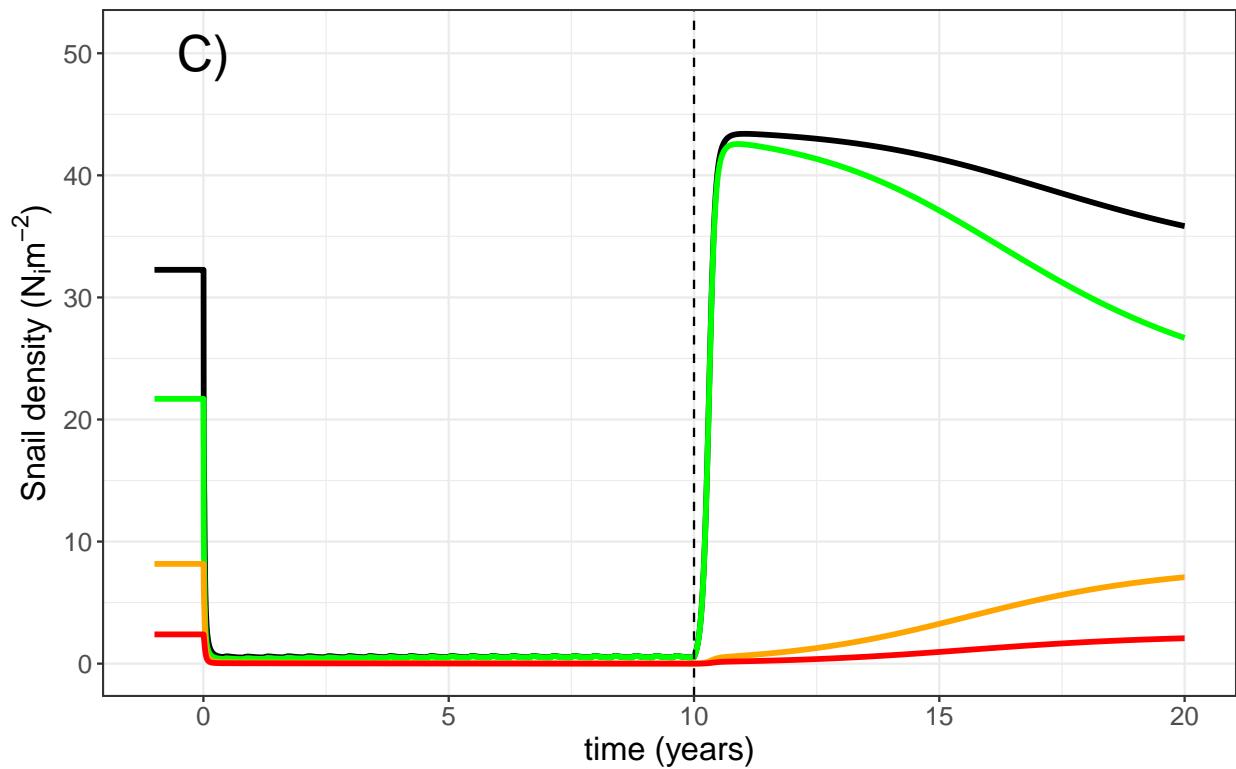
With migration





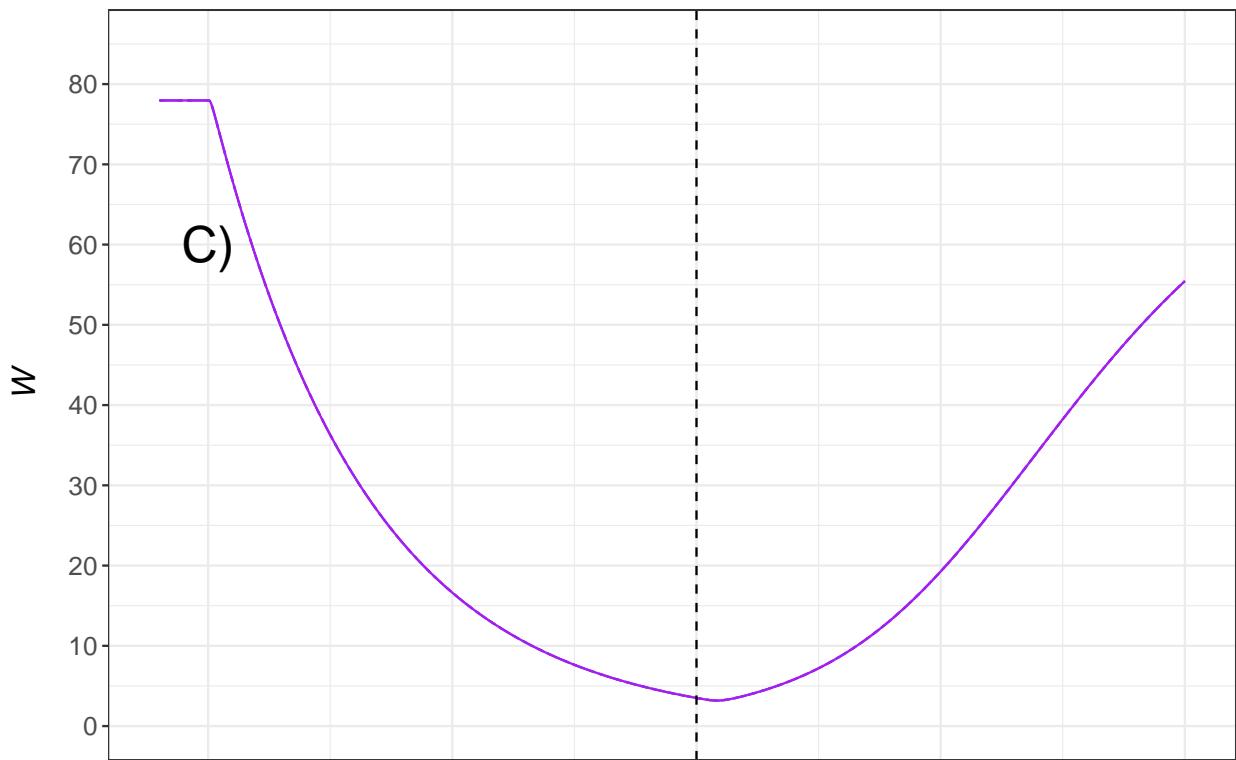
No migration

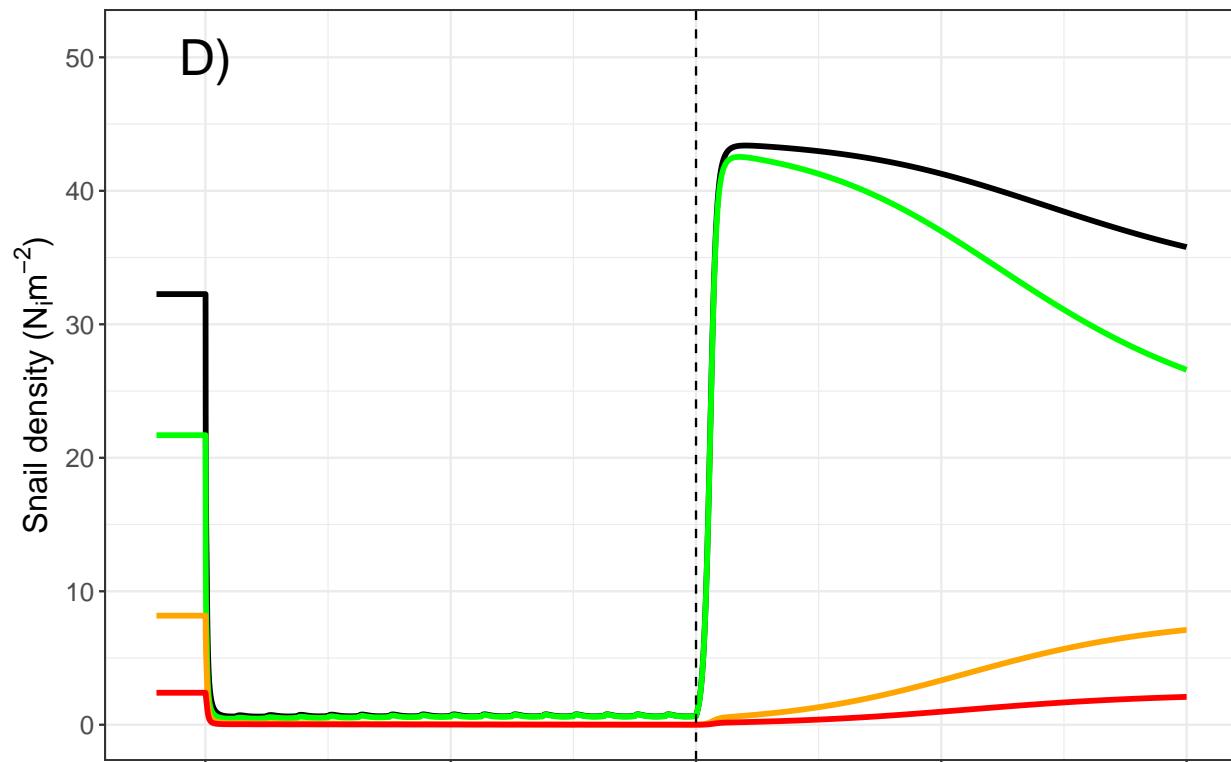




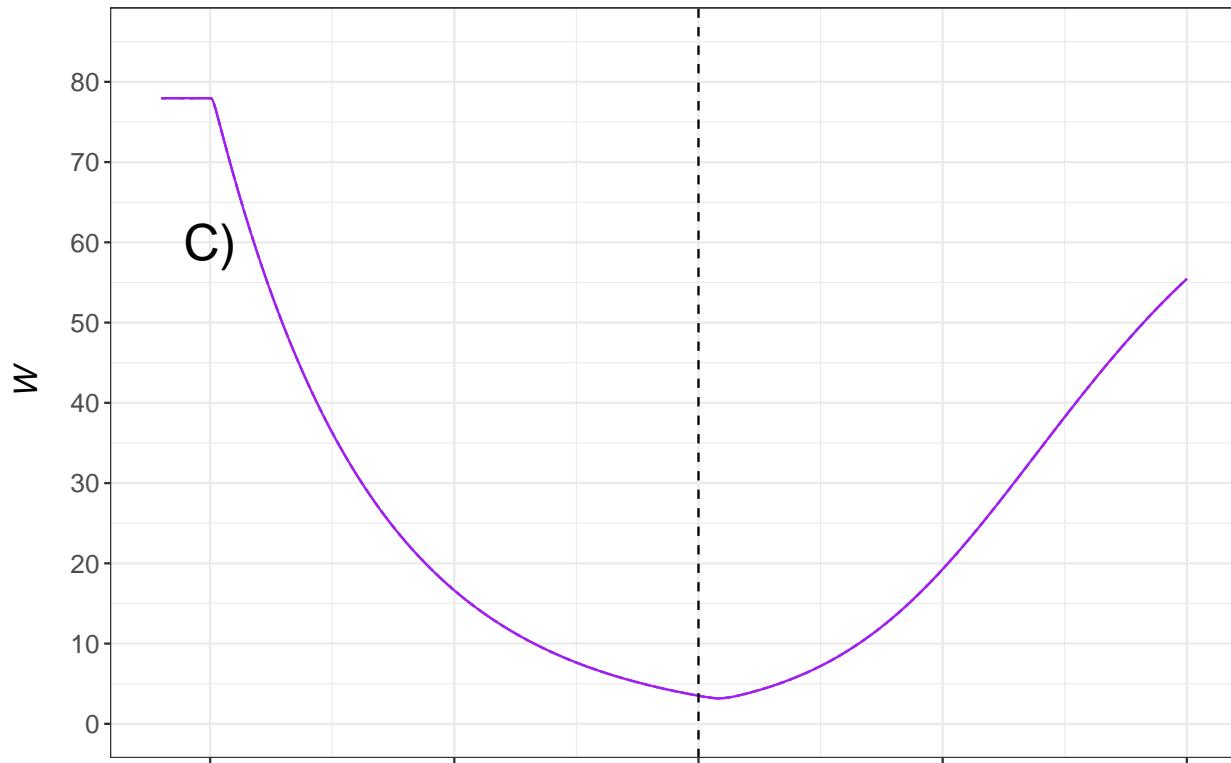
M. vollenhovenii

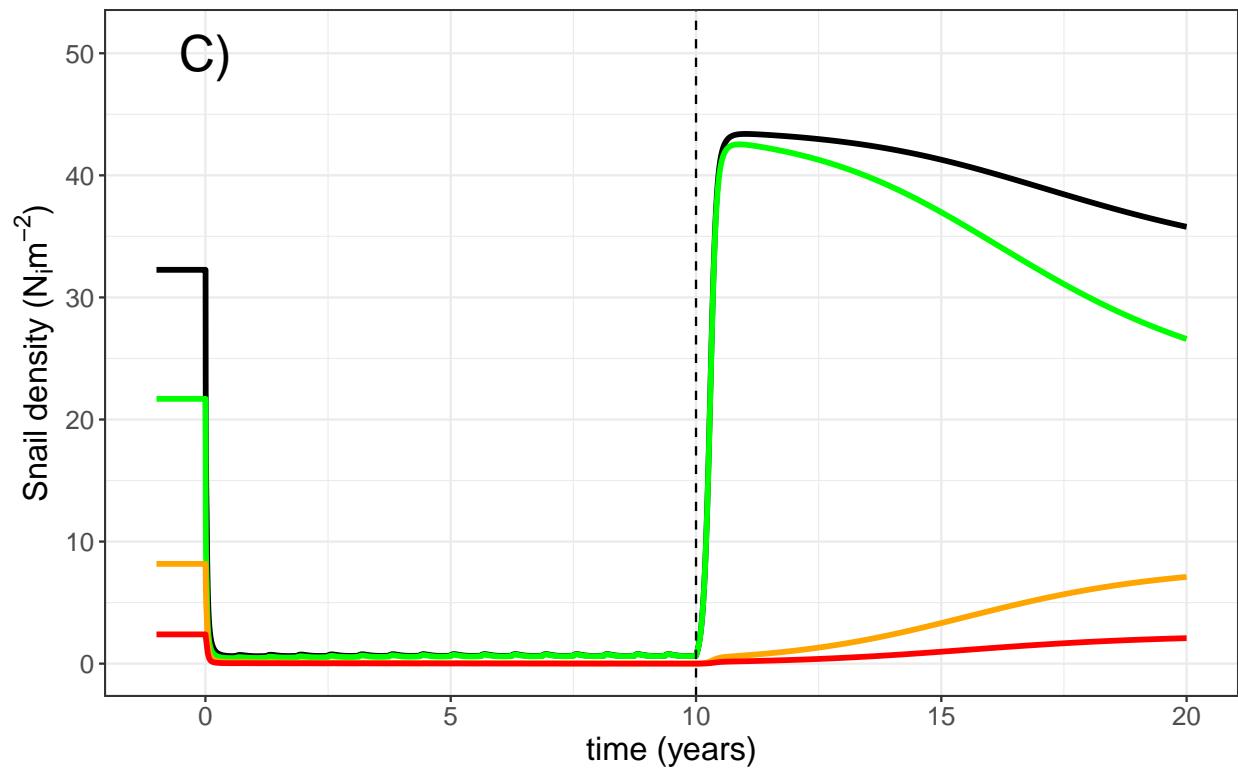
With migration





No migration

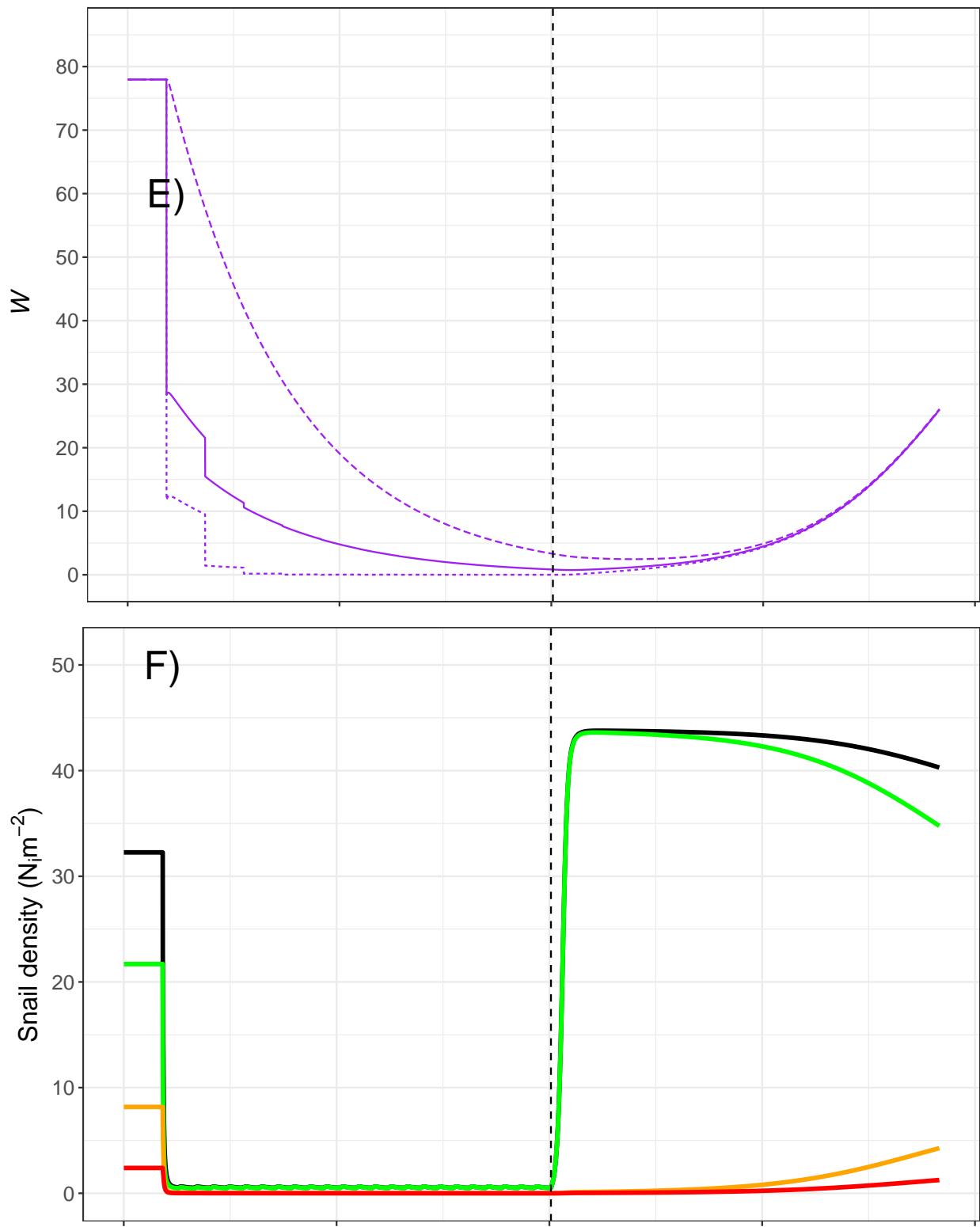




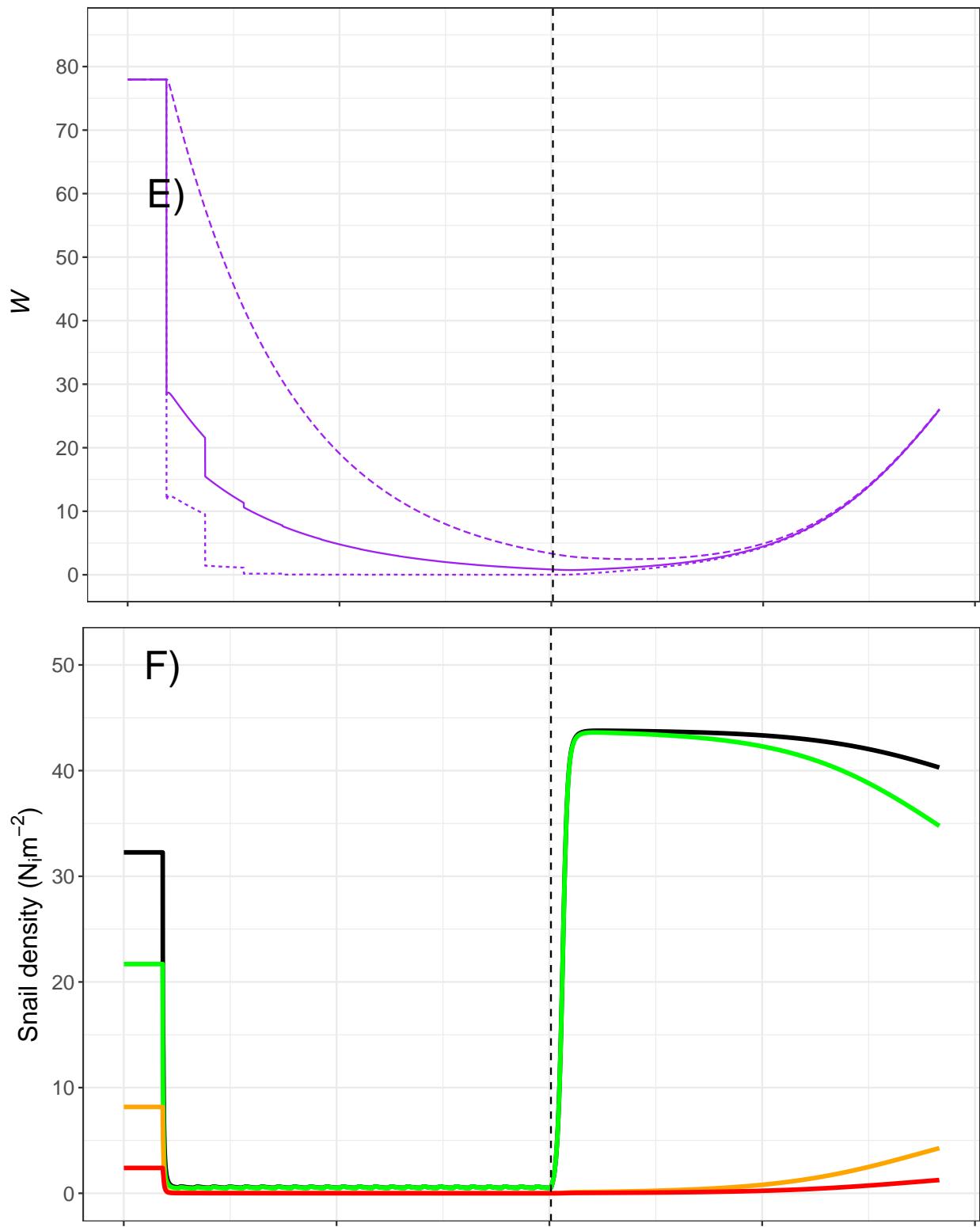
Combined Intervention

M. rosenbergii

With migration

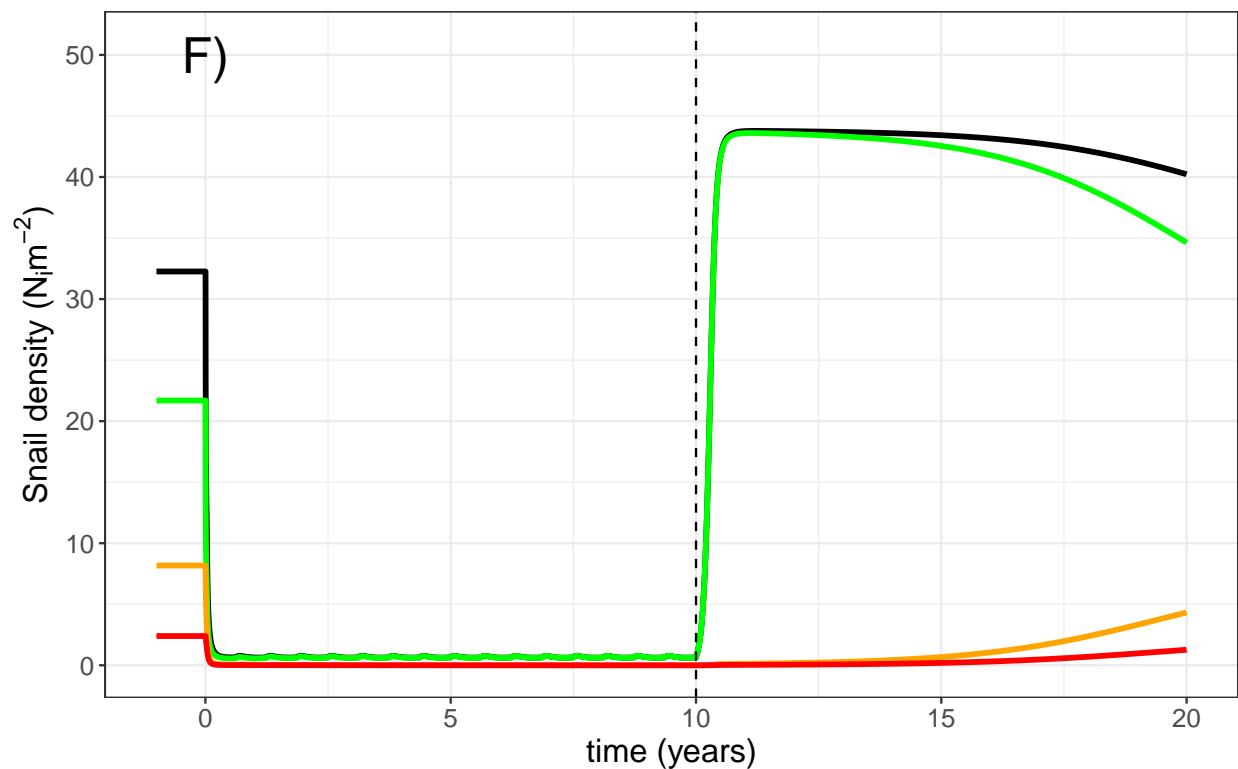
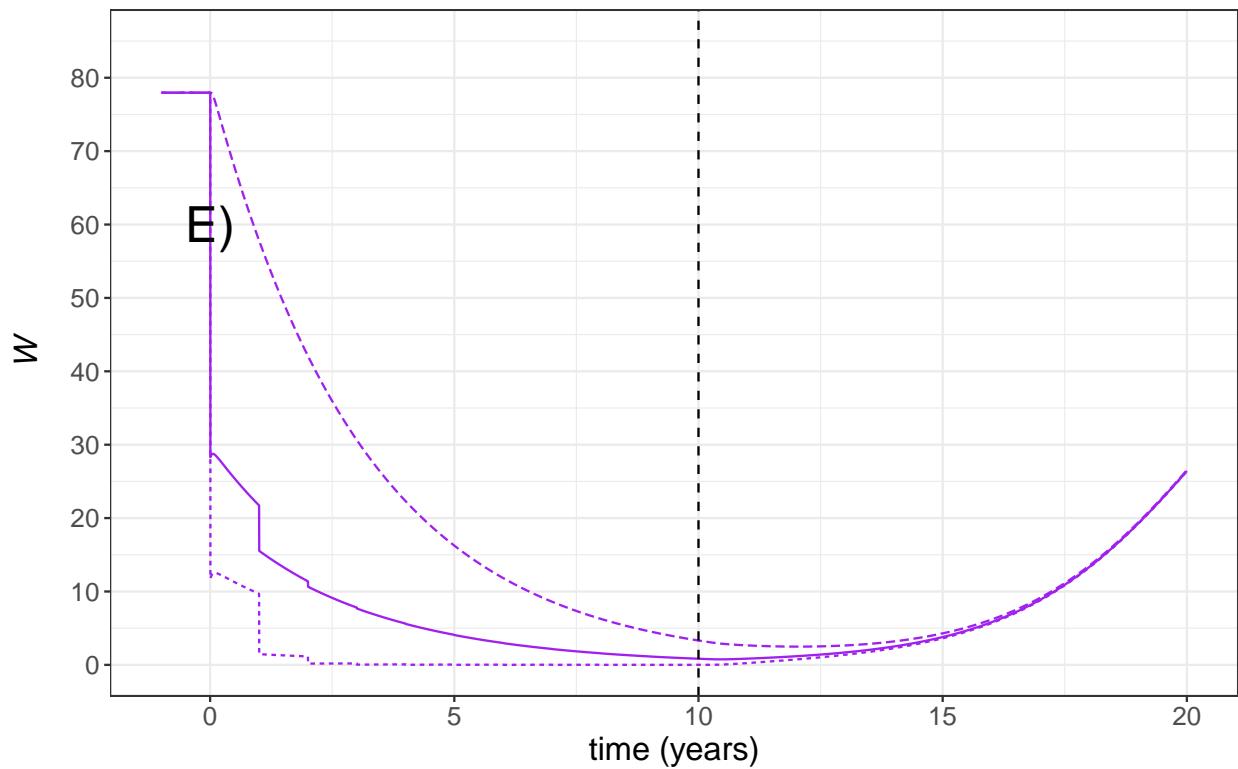


No migration

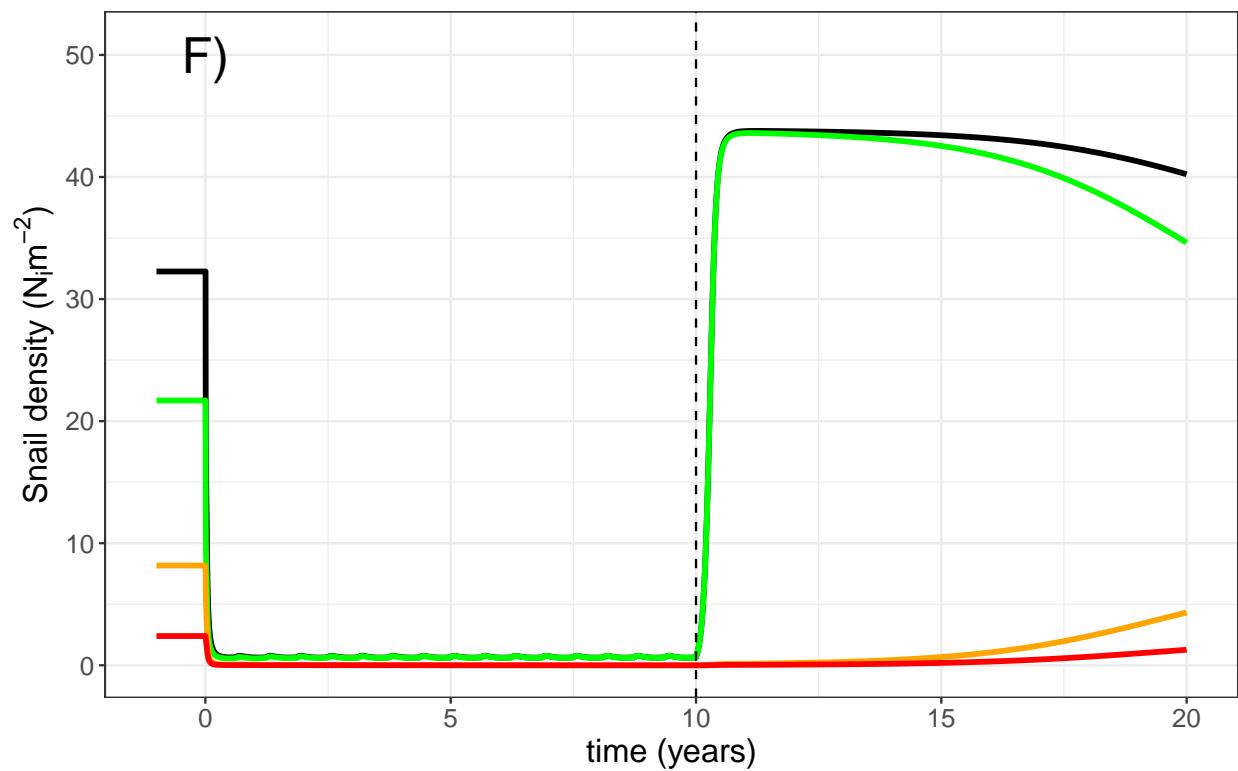
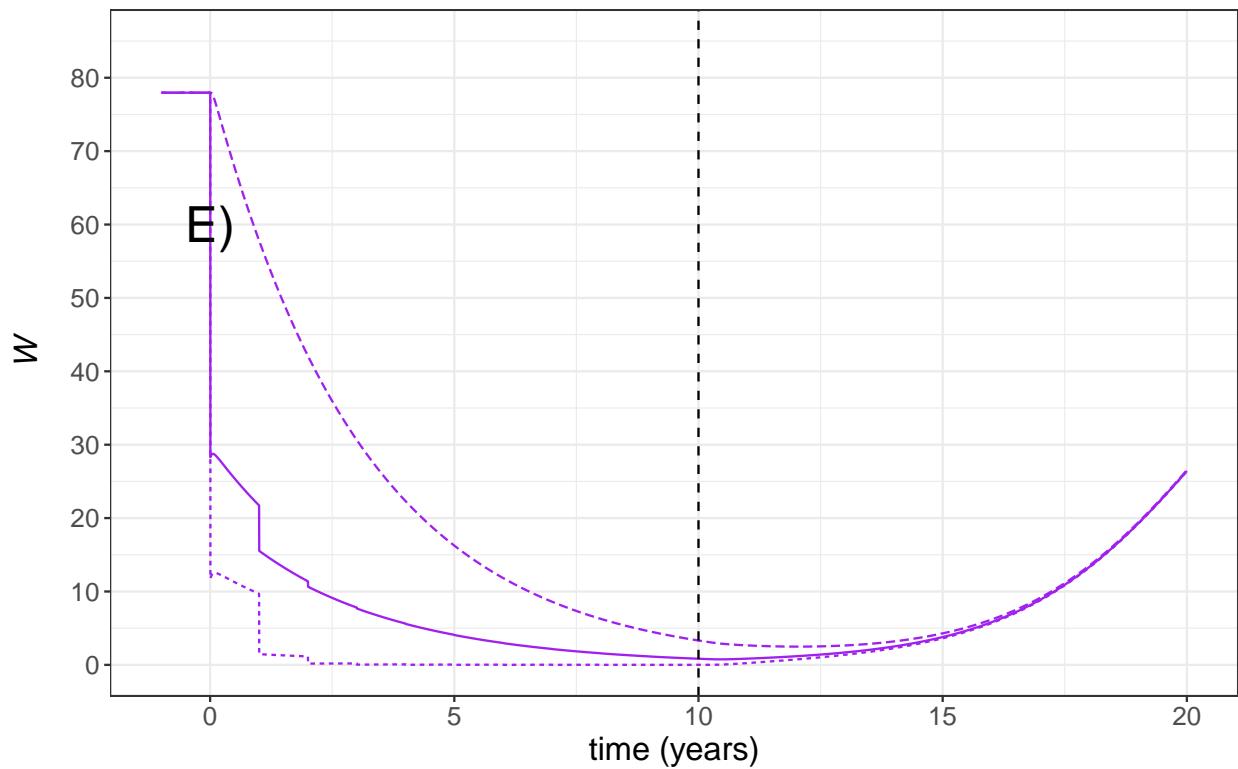


M. vollenhovenii

With migration

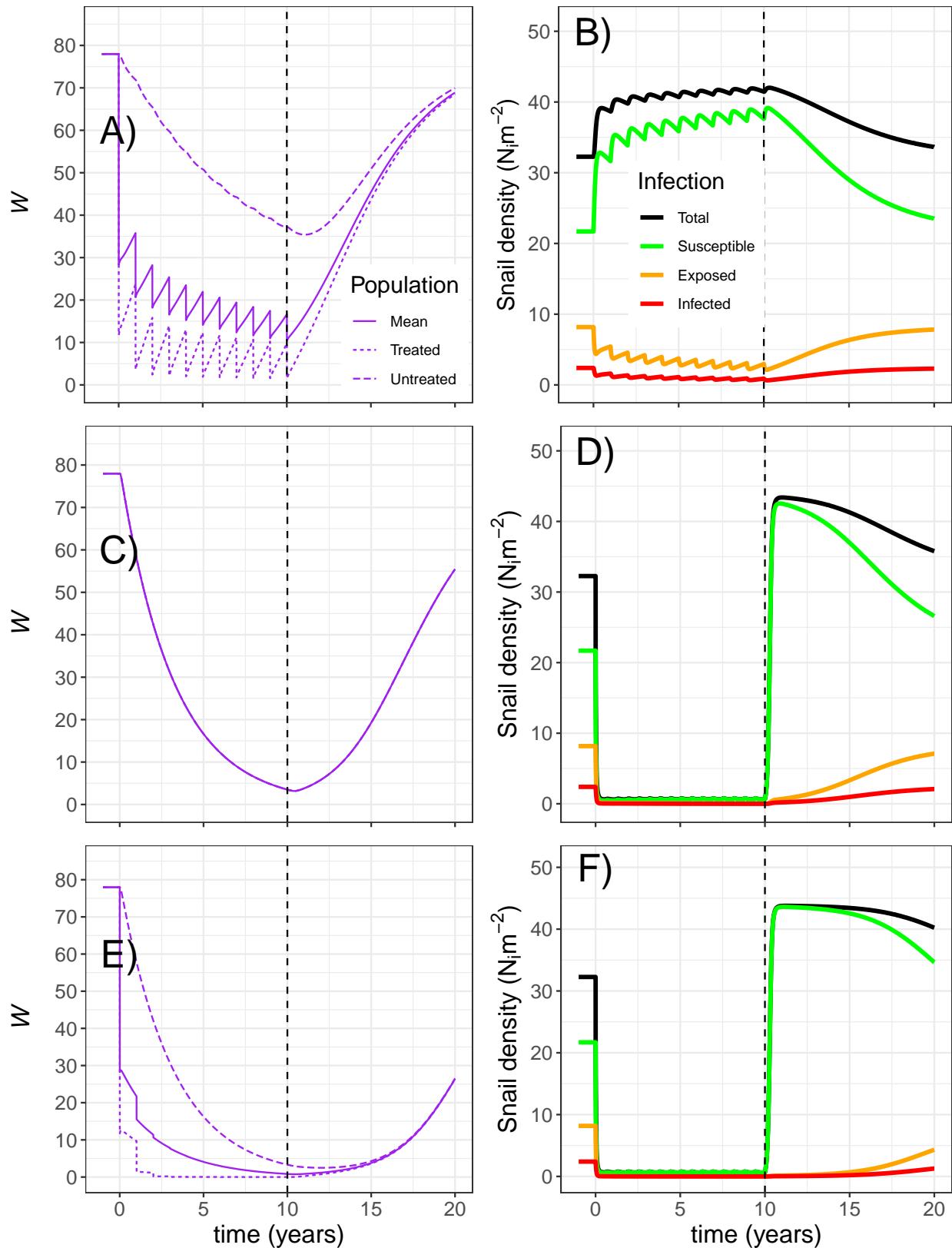


No migration



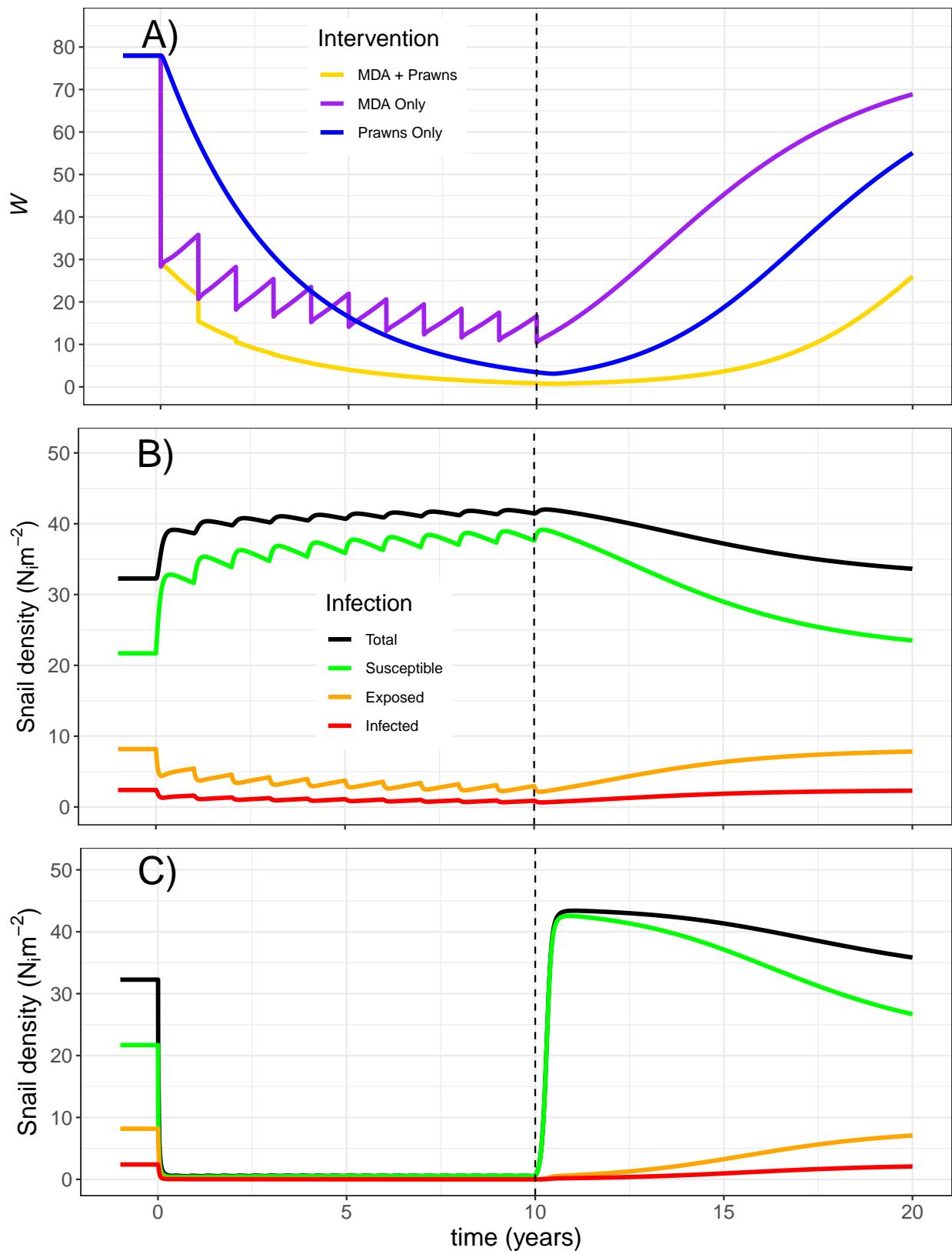
Combined epi plots

Six panel variety

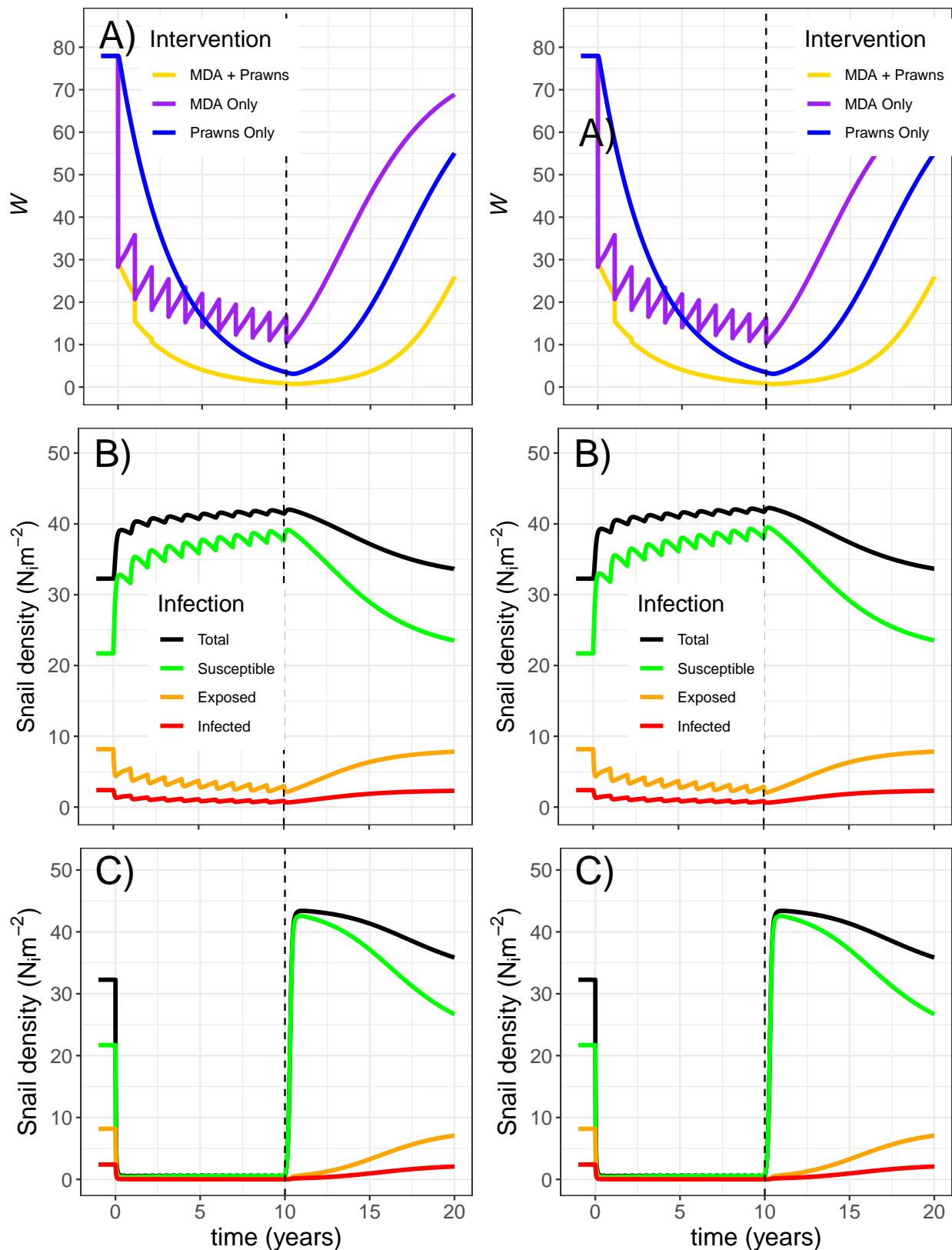


Combined worm burden plots

Three panel essentials



6-panel migration vs no migration comparison

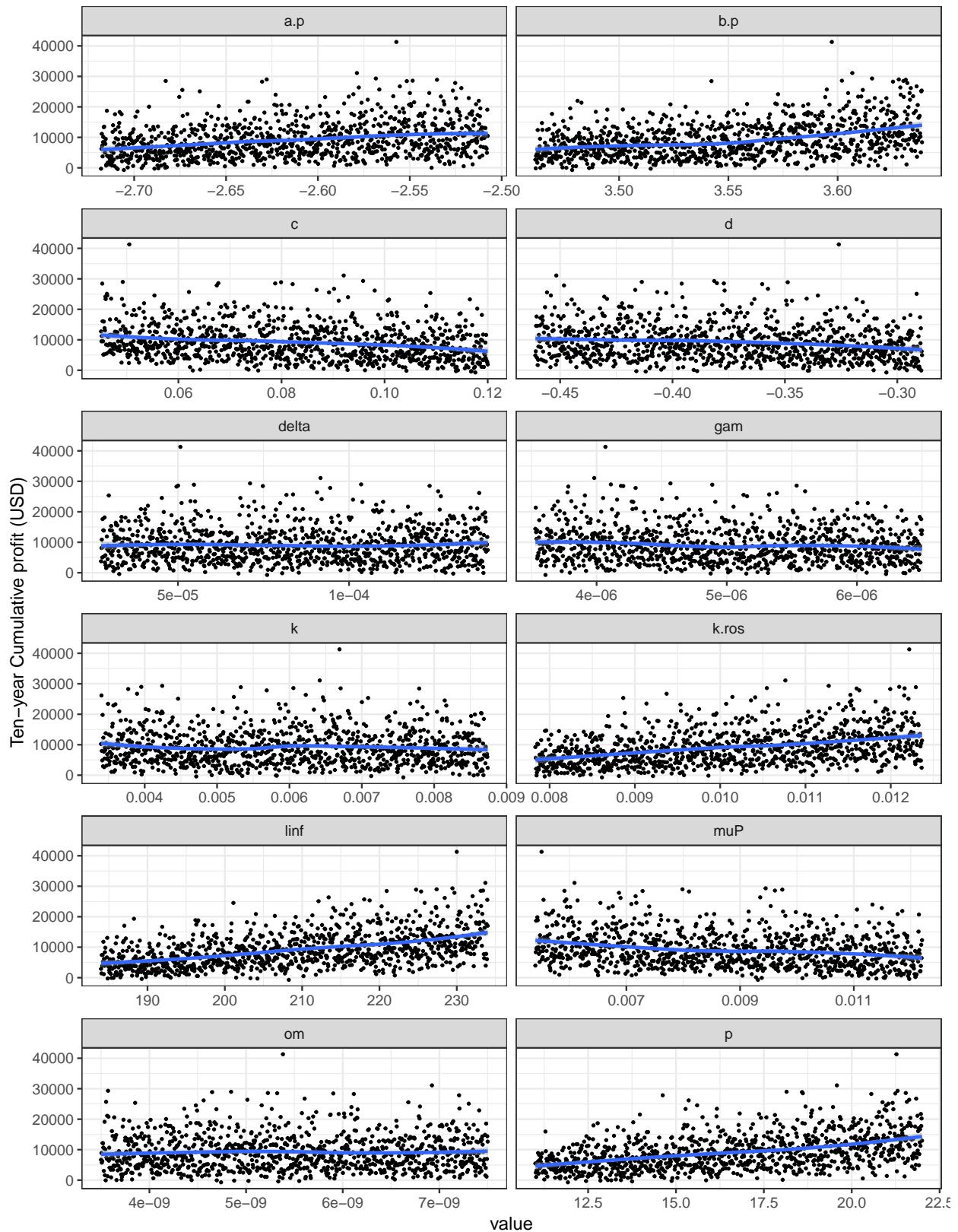


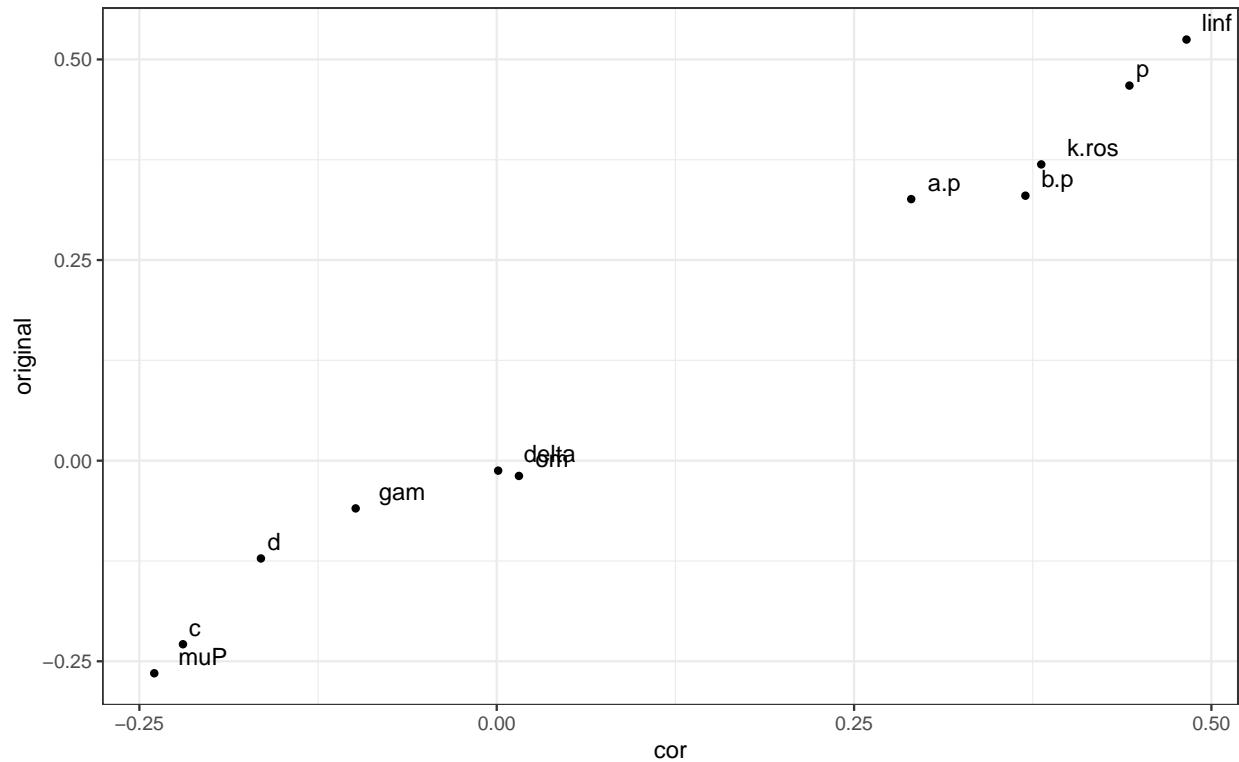
Sensitivity analysis

Check monotinicity of response variables to relevant parameters then quantify influence with PRCC

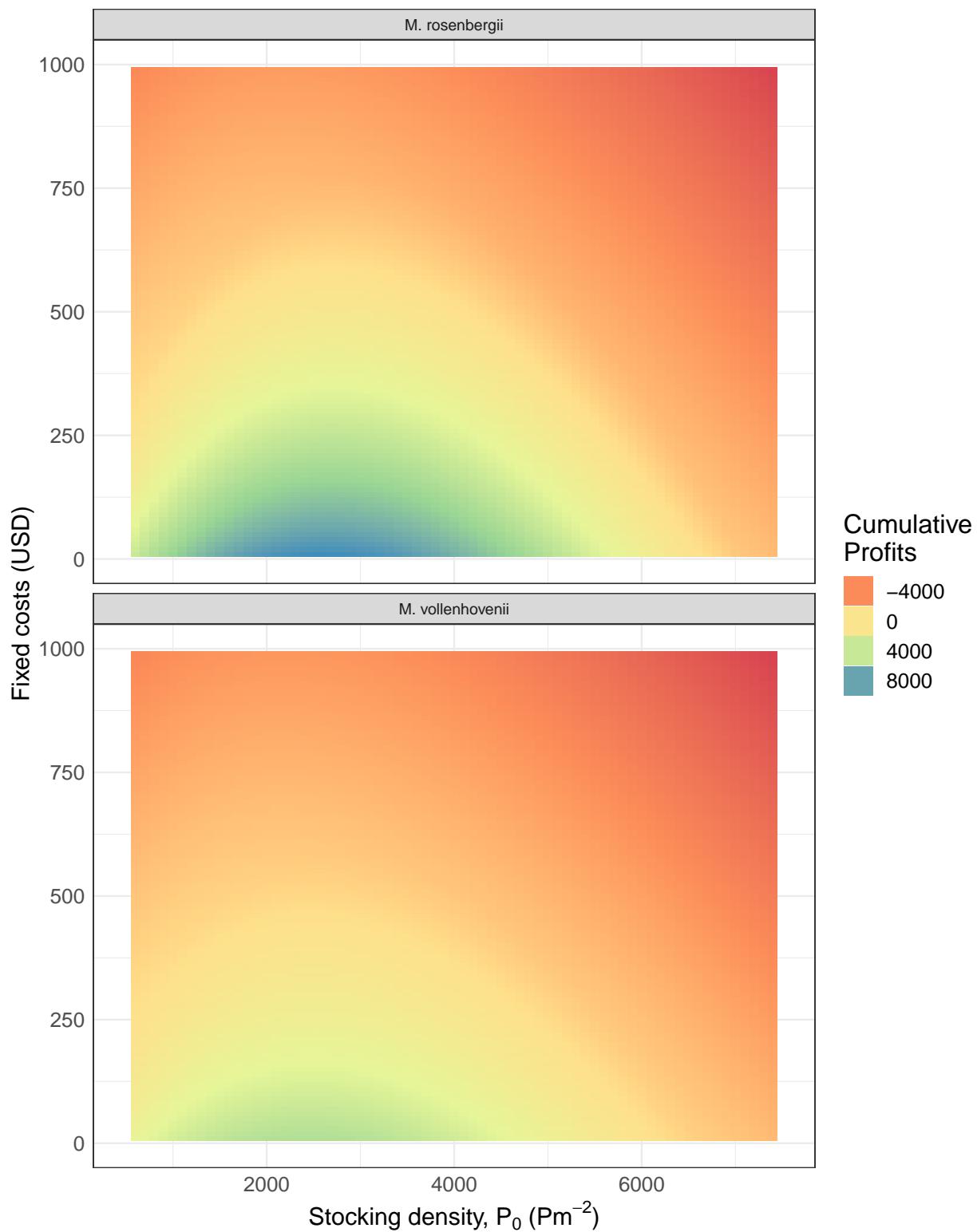
Prawn aquaculture model

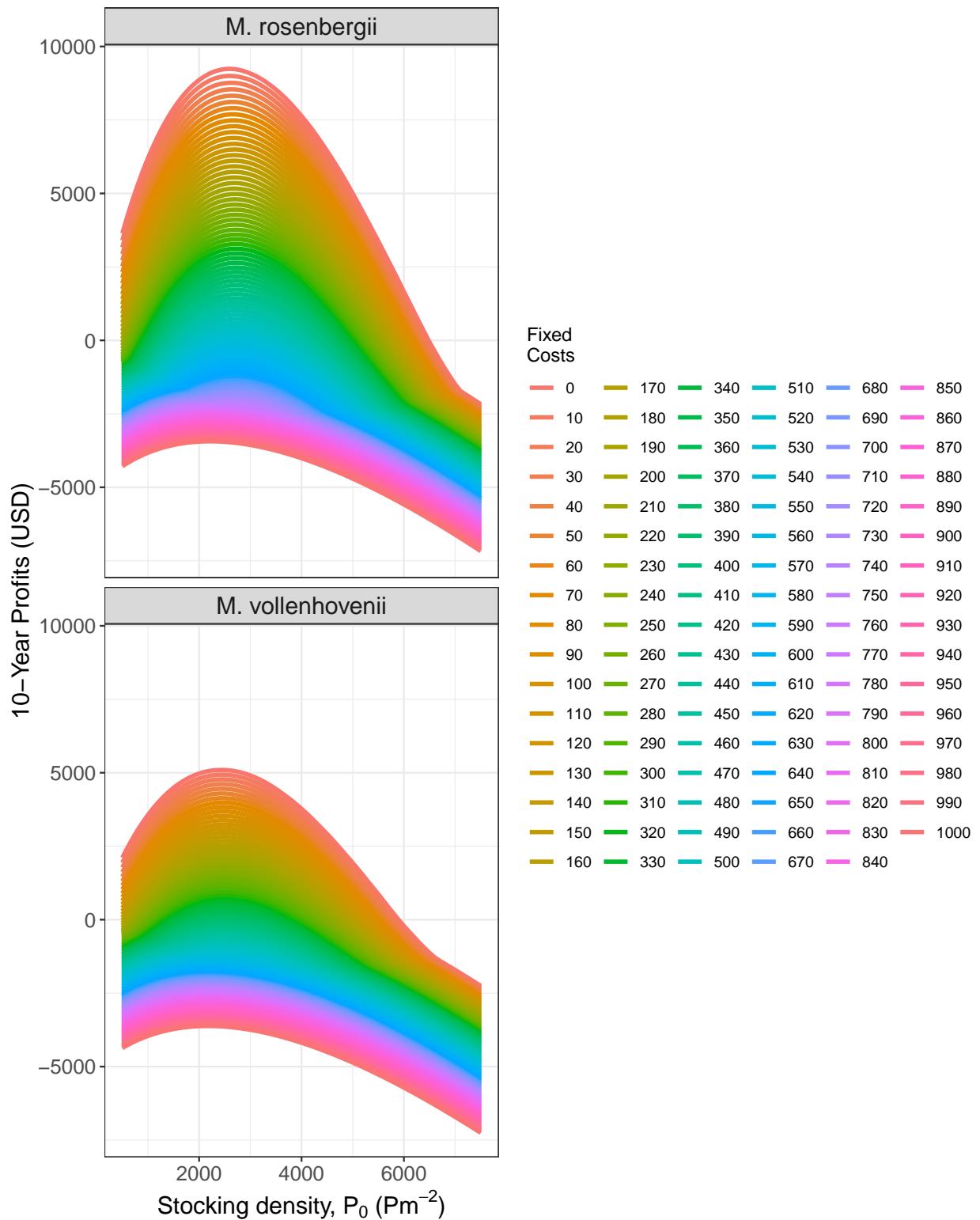
Parametric uncertainty



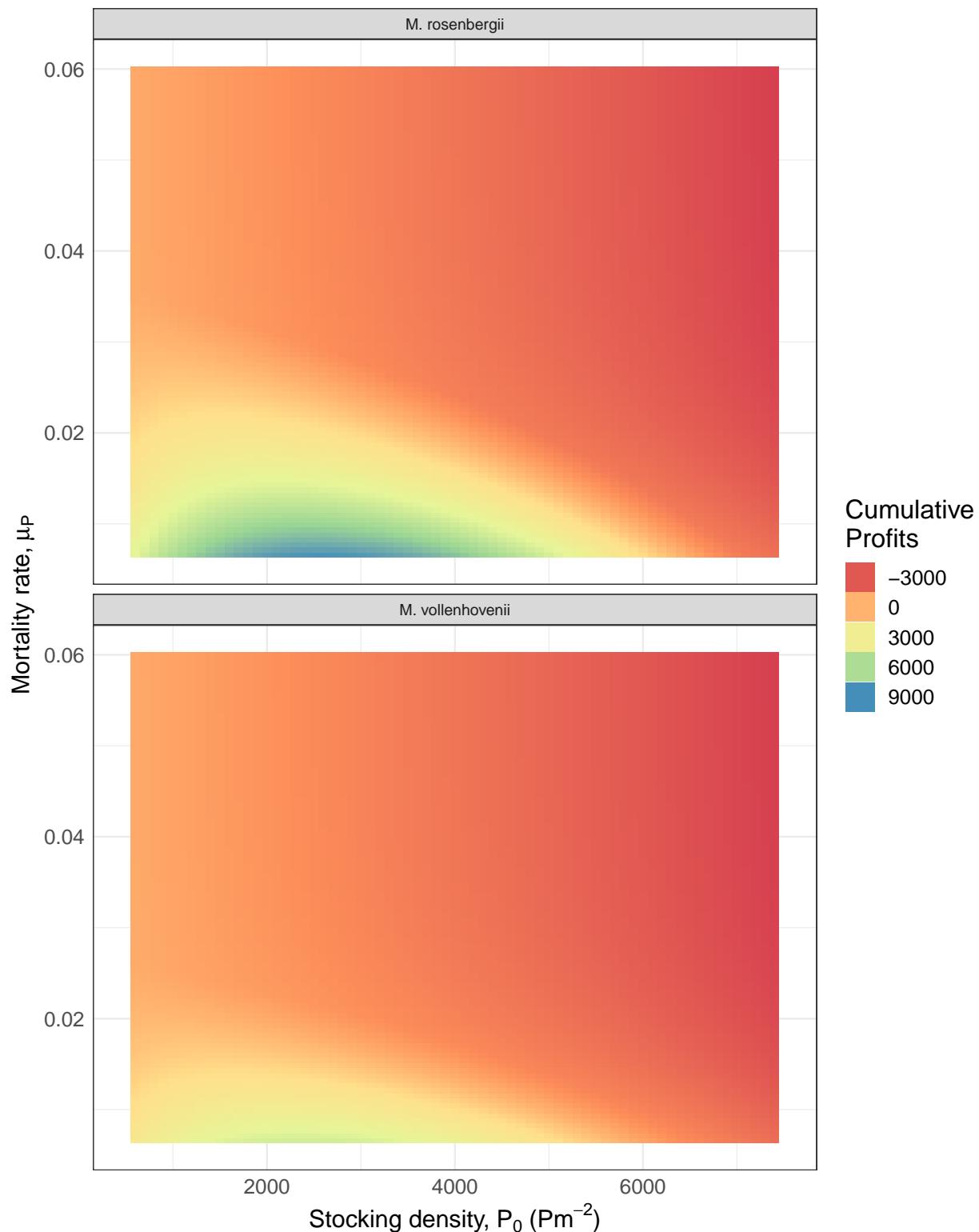


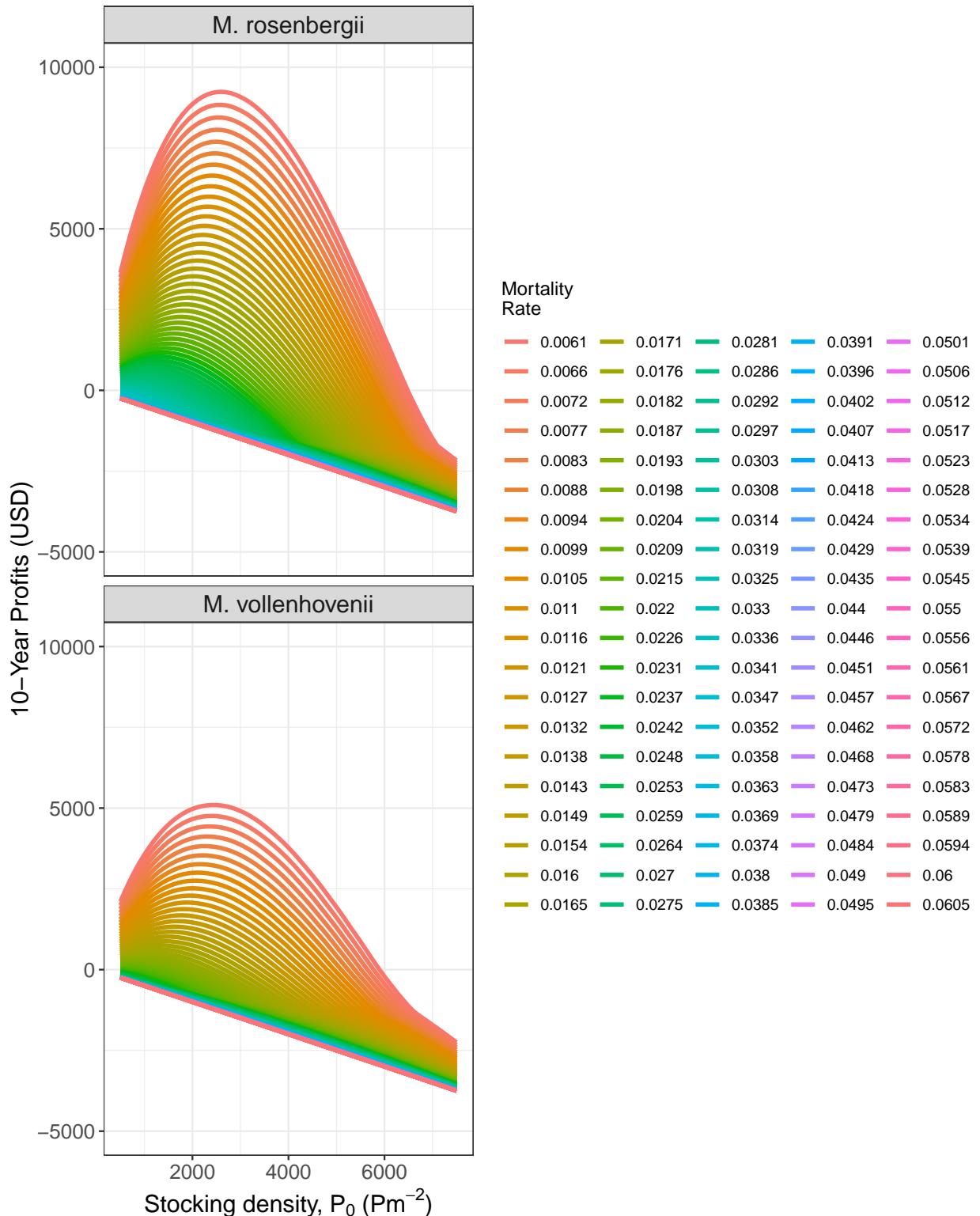
Influence of fixed costs





Influence of mortality rate

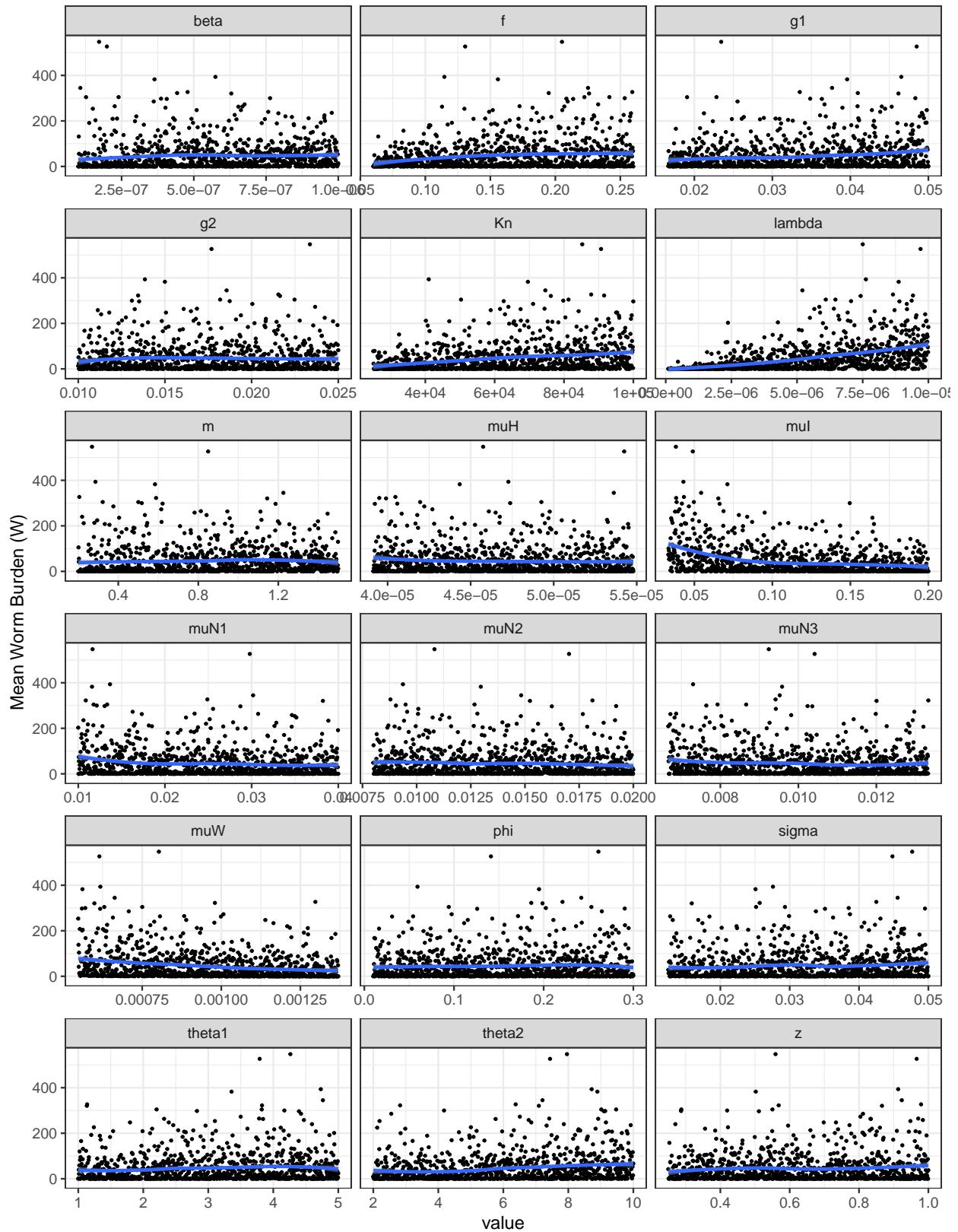


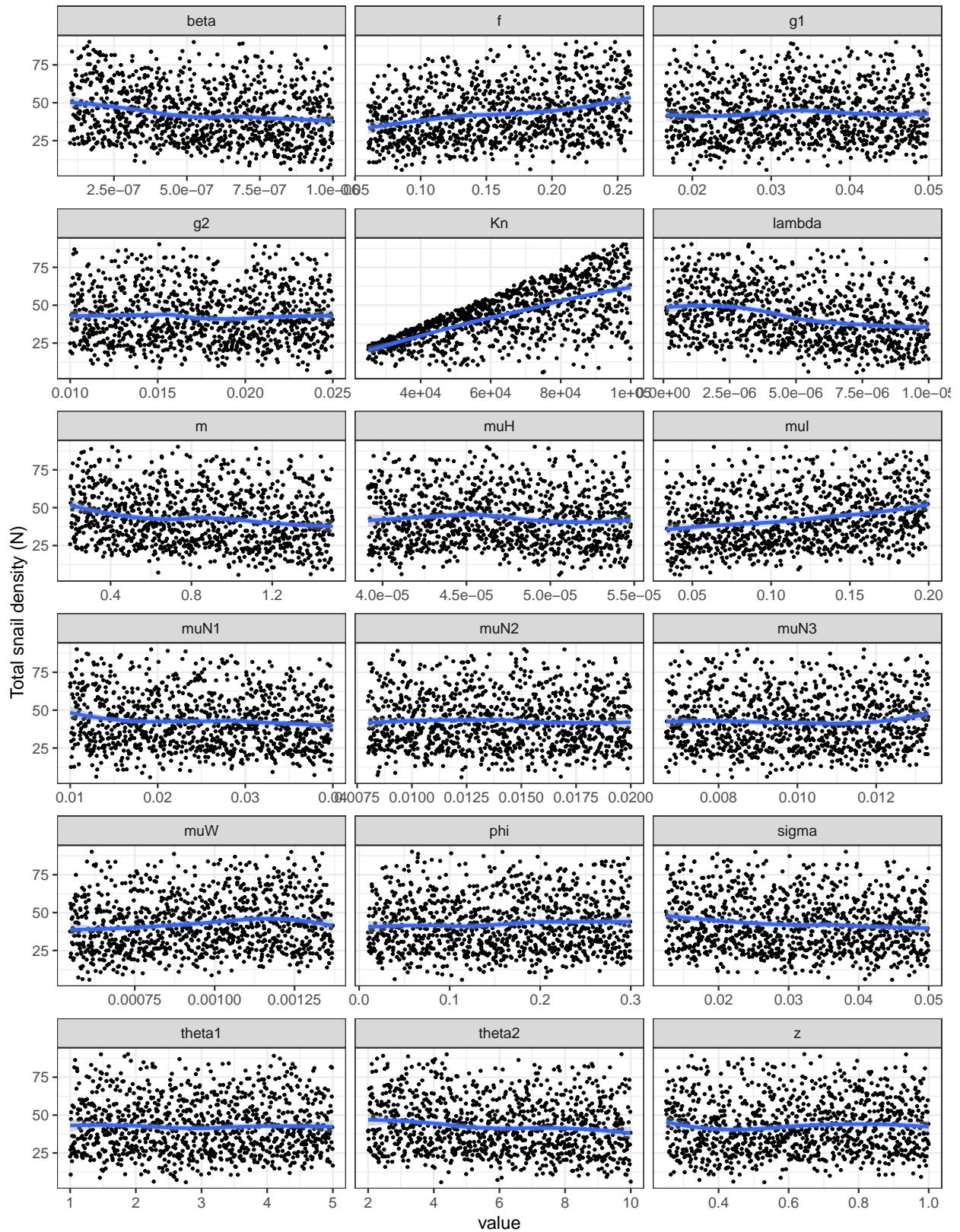


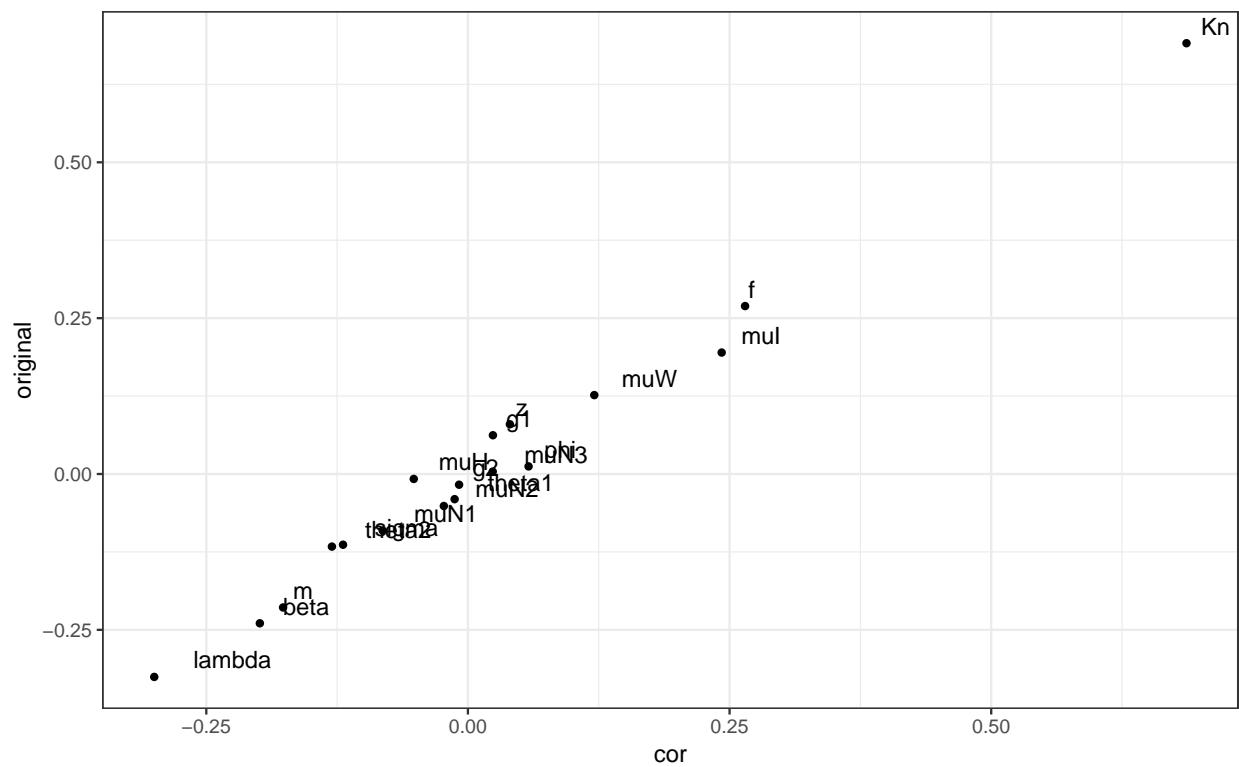
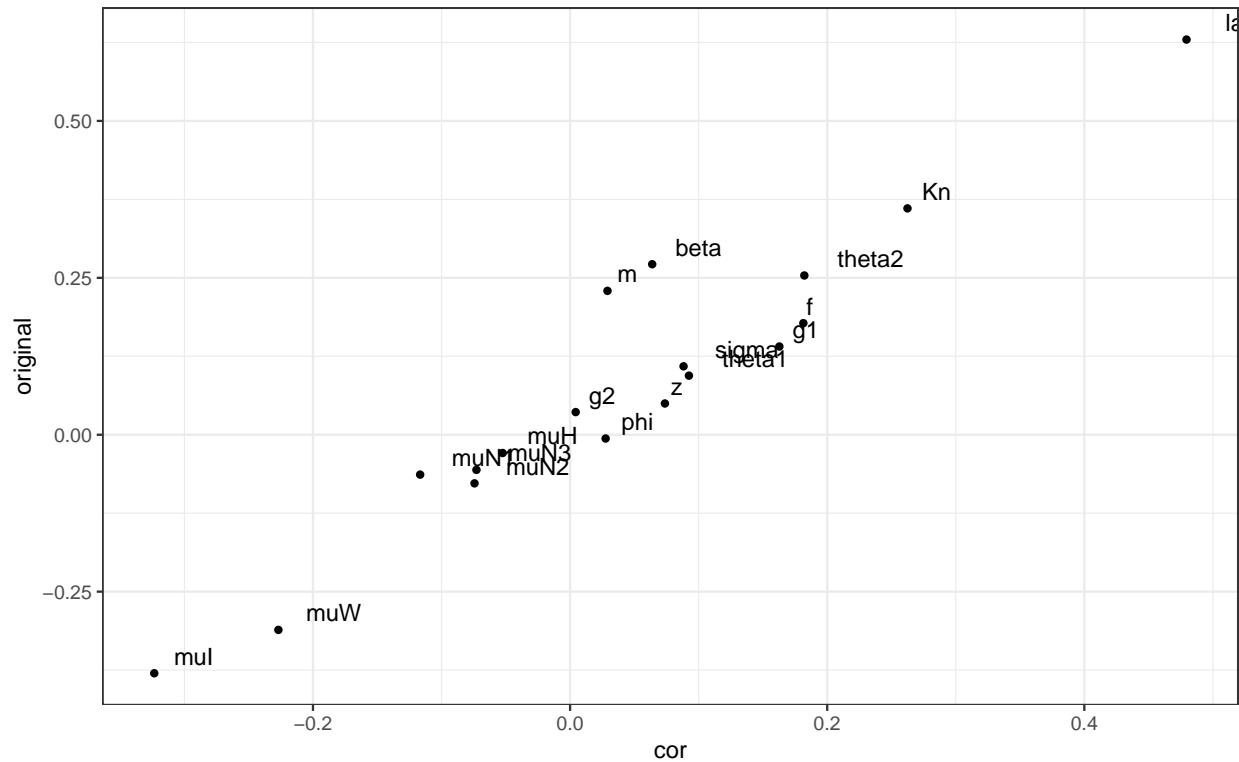
Snail epi model

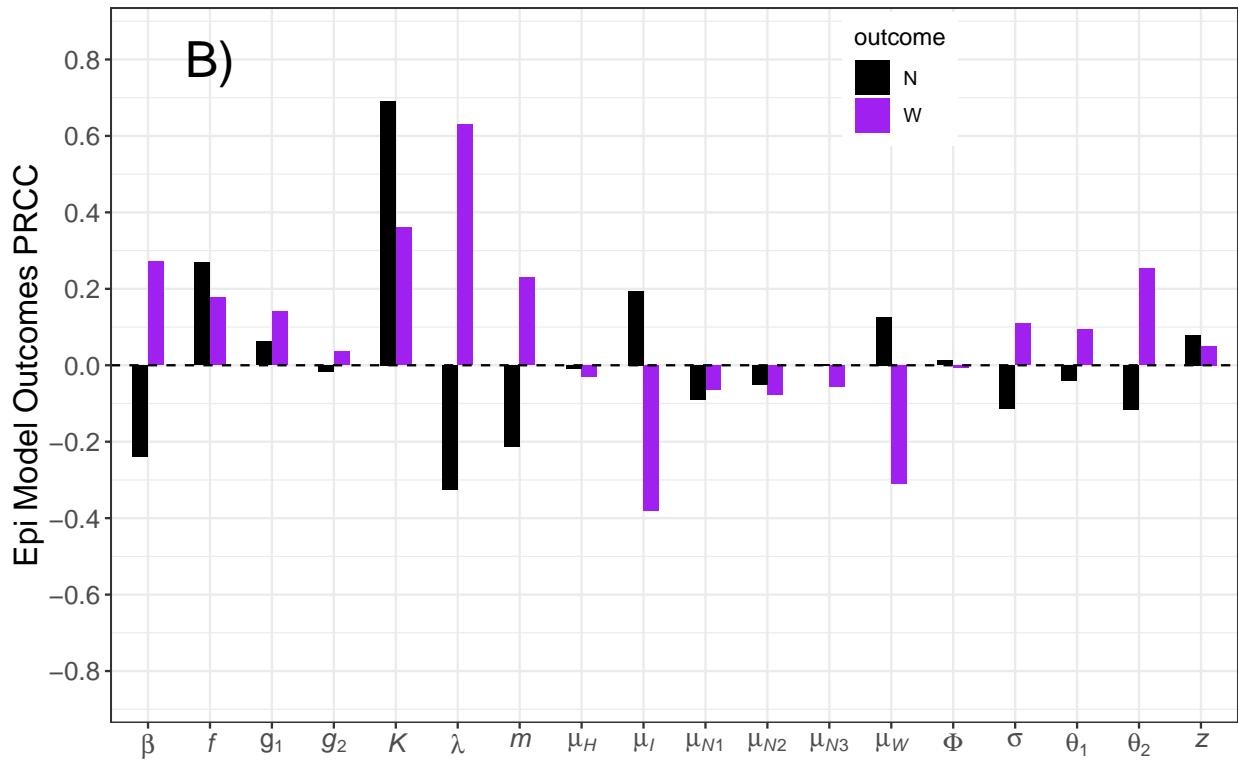
##	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
----	------	---------	--------	------	---------	------

```
## 0.0032 1.2094 18.9987 45.3967 65.9190 547.4042  
## Min. 1st Qu. Median Mean 3rd Qu. Max.  
## 5.70 28.25 40.25 42.55 54.61 90.19
```





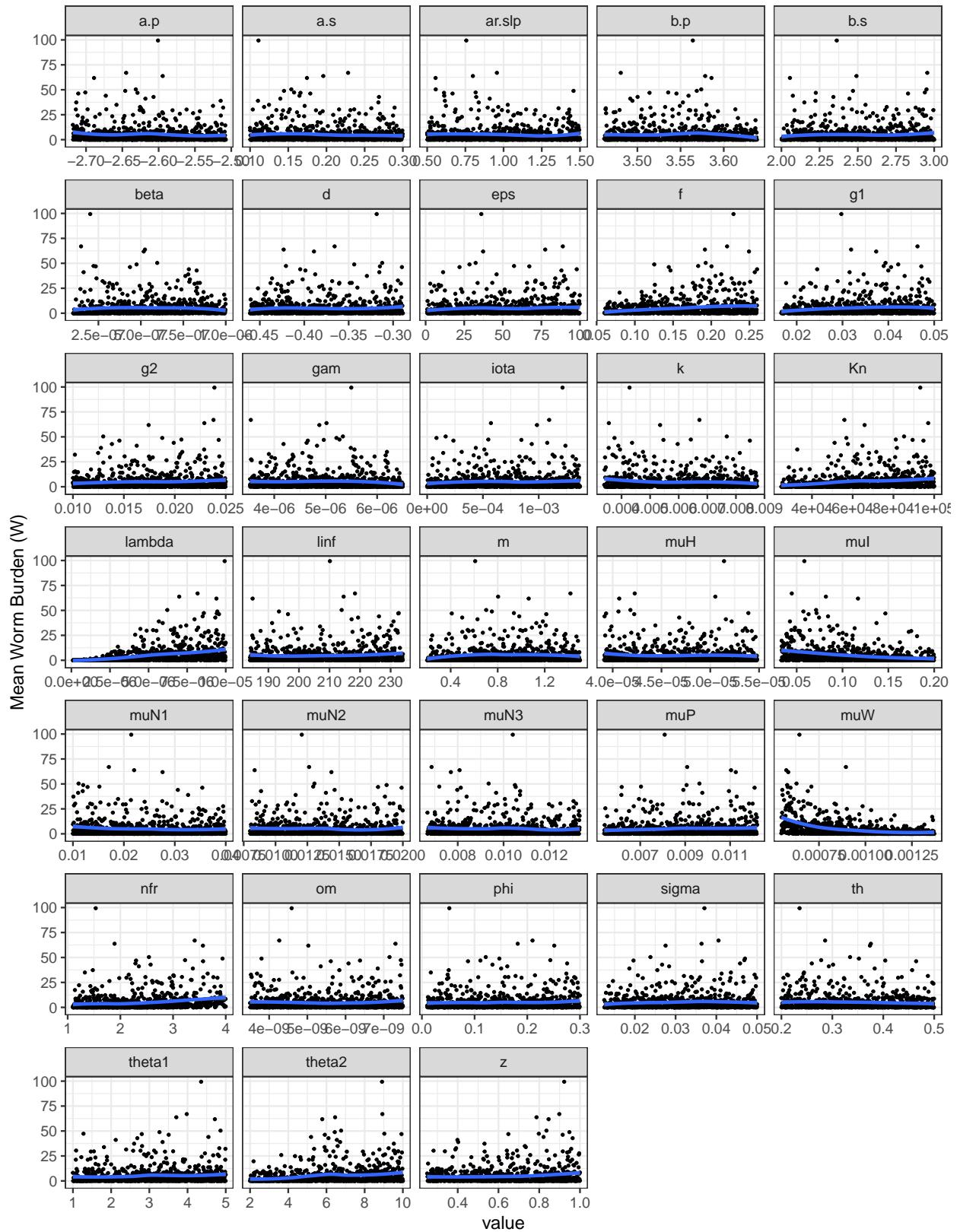


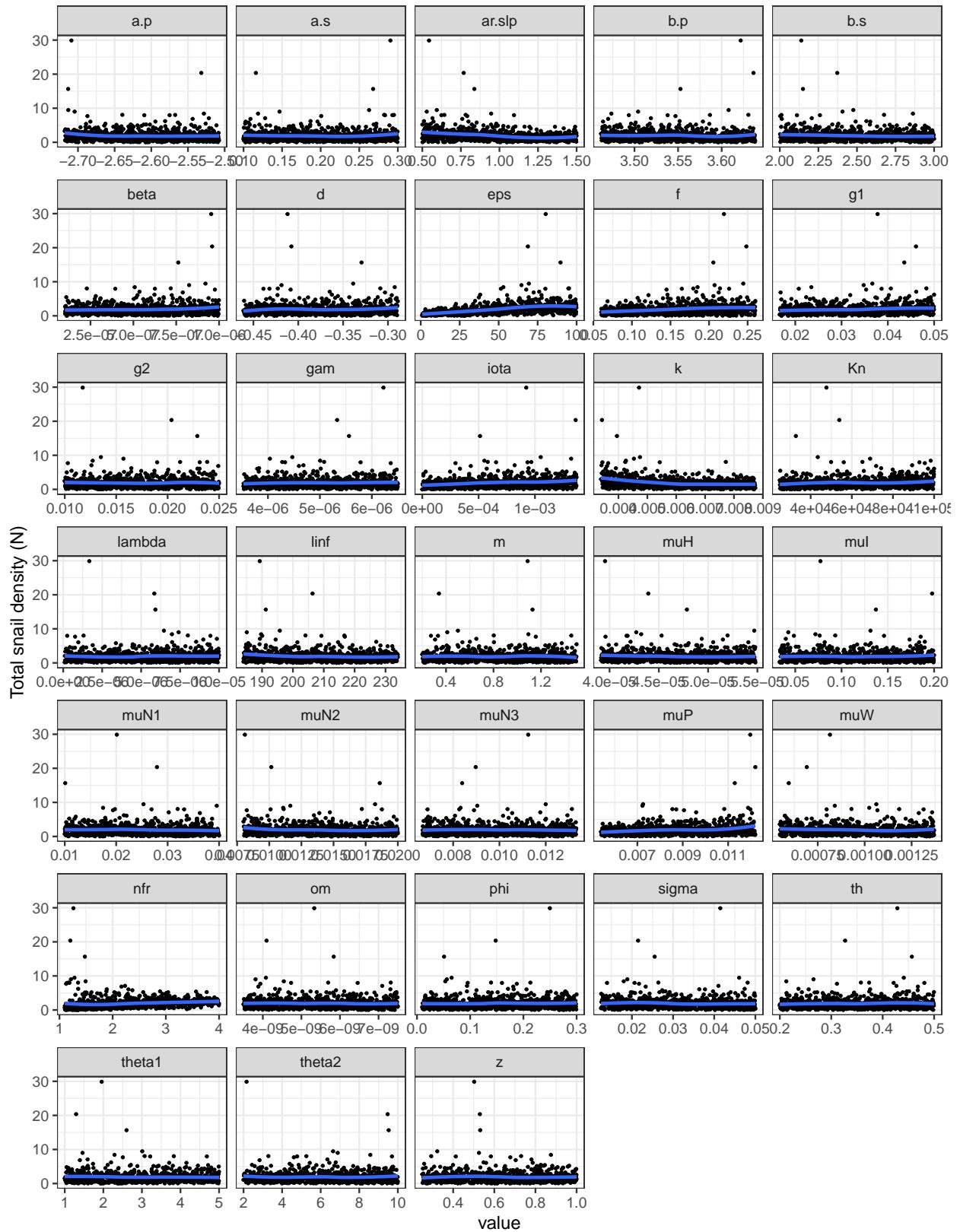


Integrated model with interventions

```
##      Min. 1st Qu. Median Mean 3rd Qu. Max. NA's
## 0.00003 0.06701 1.64846 4.97595 5.86403 99.36354 201
```

```
##      Min. 1st Qu. Median Mean 3rd Qu. Max. NA's
## 0.00045 0.78991 1.68085 1.92957 2.52556 29.87187 201
```





Some parameter sets cause the model to error out which returns NA using the possibly function. Want to check what causes these model runs to crash

