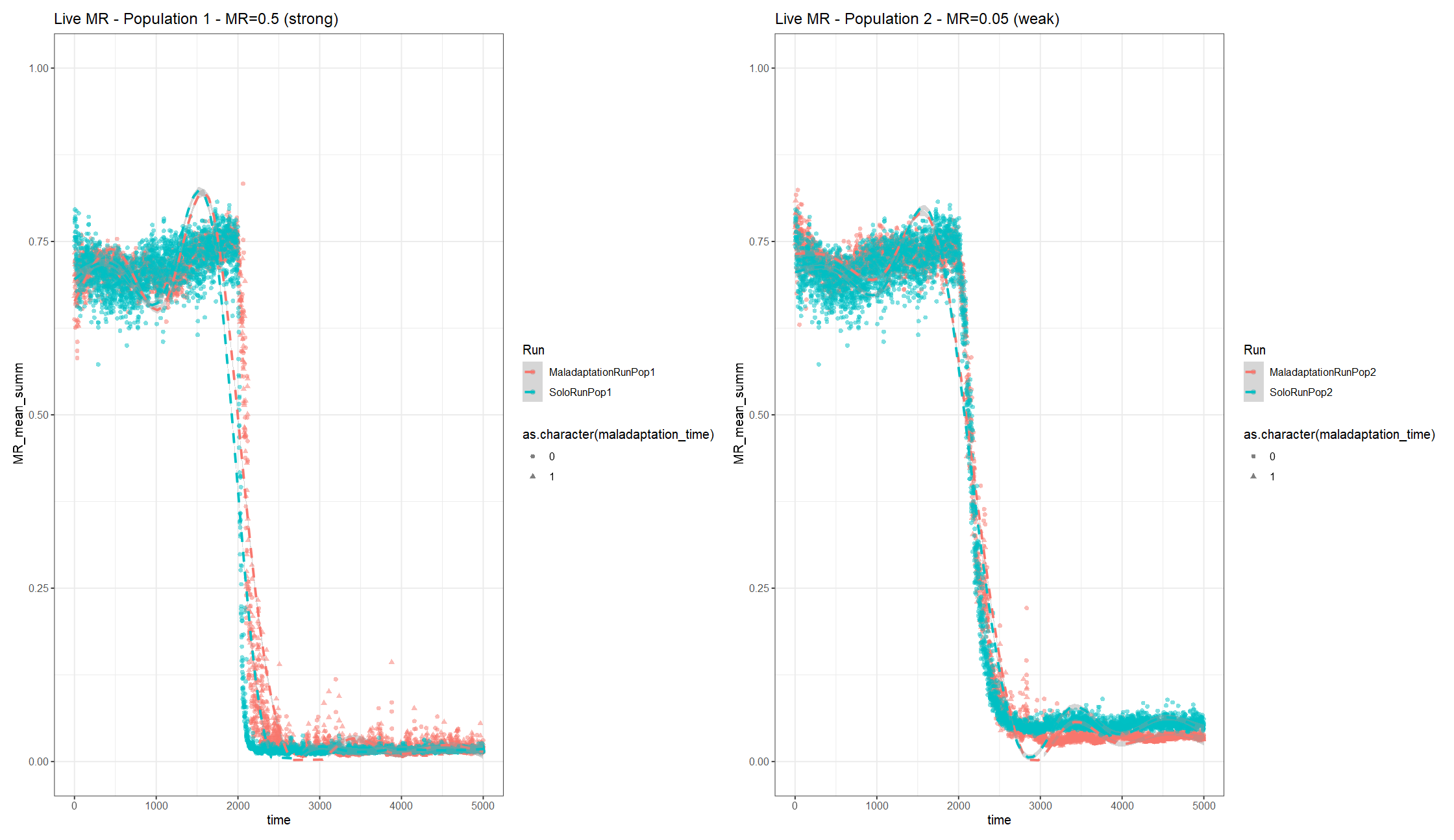
## Updated MR inheritance + competition + MR scale (removed initial rescale, converted all to 0-1) – Recruitment 0.003

|  |  |  |
| --- | --- | --- |
|  | | |
| age\_impact = 1.0  MR\_death\_impact = F  MR\_lateintro = F  recruitment\_const = 0.003  comp\_impact = 0.9 |  |  |
| age\_impact = 1.0  MR\_death\_impact = 0.05  MR\_lateintro = F  recruitment\_const = 0.003  comp\_impact = 0.9 |  |  |
|  |  |  |
| age\_impact = 1.0  MR\_death\_impact = 0.1  MR\_lateintro = F  recruitment\_const = 0.003  comp\_impact = 0.9 |  |  |
| age\_impact = 1.0  MR\_death\_impact = 0.1  MR\_lateintro = T - 2000  recruitment\_const = 0.003  comp\_impact = 0.9 |  |  |
| age\_impact = 1.0  MR\_death\_impact = 0.15  MR\_lateintro = F  recruitment\_const = 0.003  comp\_impact = 0.9 |  |  |
| age\_impact = 1.0  MR\_death\_impact = 0.2  MR\_lateintro = F  recruitment\_const = 0.003  comp\_impact = 0.9 |  |  |
| age\_impact = 1.0  MR\_death\_impact = 0.2  MR\_lateintro = T - 2000  recruitment\_const = 0.003  comp\_impact = 0.9 |  |  |
| age\_impact = 1.0  MR\_death\_impact = 0.5  MR\_lateintro = F  recruitment\_const = 0.003  comp\_impact = 0.9 |  |  |
| age\_impact = 1.0  MR\_death\_impact = 0.5  MR\_lateintro = T - 2000  recruitment\_const = 0.003  comp\_impact = 0.9 |  |  |

|  |  |  |
| --- | --- | --- |
| Pop 1  Age imp val = 1.0  MR imp val = 0.5  Pop 2  Age imp val = 1.0  MR imp val = 0.05 | Blue = runs without maladaptation events (running it solo)  Red = runs with maladaptation events (running both pops in conjunction)  Where for each side pop 1, maladapts with pop 2 (triangle events)  For the left side, pop 1, the maladapted pop is brought higher with the influence of pop2  For the right side, the population is |  |



## Change MR recruitment to ^2 instead of ^4; adjust MR inheritance by -0.08

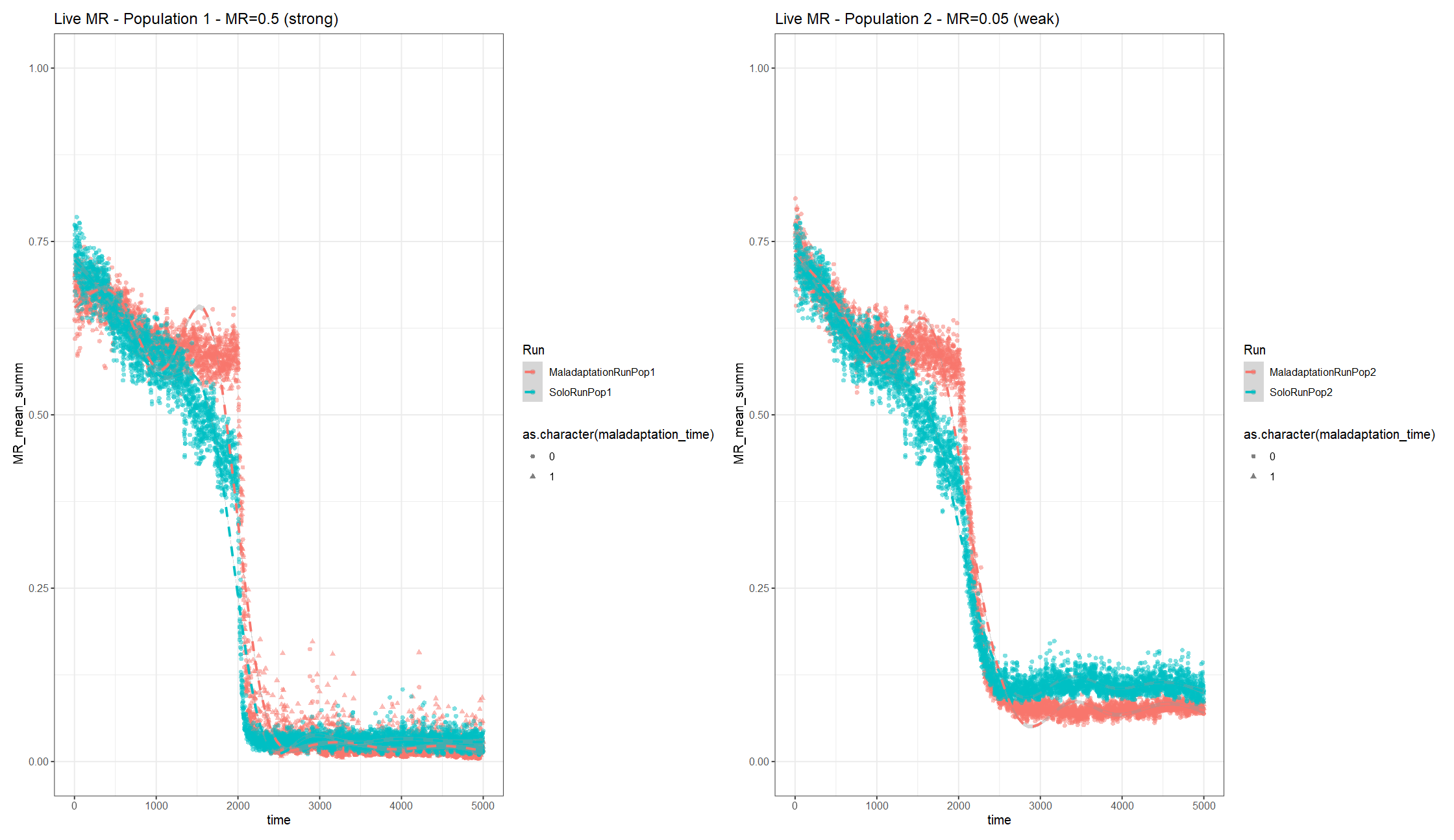
|  |  |  |
| --- | --- | --- |
| age\_impact = 1.0  MR\_death\_impact = F  MR\_lateintro = F  recruitment\_const = 0.003  comp\_impact = 0.9 | A graph of a graph of a person's size  AI-generated content may be incorrect. | A graph of time and time  AI-generated content may be incorrect. |
| age\_impact = 1.0  MR\_death\_impact = 0.1  MR\_lateintro = T - 1000  recruitment\_const = 0.003  comp\_impact = 0.9 |  | A graph of time and time  AI-generated content may be incorrect. |
| age\_impact = 1.0  MR\_death\_impact = 0.2  MR\_lateintro = T - 1000  recruitment\_const = 0.003  comp\_impact = 0.9 | A graph of a person's size  AI-generated content may be incorrect. | A graph of time and time  AI-generated content may be incorrect. |
| A graph with a number of boxes  AI-generated content may be incorrect. | A graph with a chart and text  AI-generated content may be incorrect. |
| T=2000 | A graph of different sizes and numbers  AI-generated content may be incorrect. |  |
| A graph of a chart  AI-generated content may be incorrect. | A graph with black lines  AI-generated content may be incorrect. |
| age\_impact = 1.0  MR\_death\_impact = 0.5  MR\_lateintro = F  recruitment\_const = 0.003  comp\_impact = 0.9 |  |  |
| age\_impact = 1.0  MR\_death\_impact = 0.5  MR\_lateintro = T - 1000  recruitment\_const = 0.003  comp\_impact = 0.9 | A graph of a graph of a person's size  AI-generated content may be incorrect. | A graph of time and time  AI-generated content may be incorrect. |
| age\_impact = 1.0  MR\_death\_impact = 0.75  MR\_lateintro = T - 1000  recruitment\_const = 0.003  comp\_impact = 0.9 | A graph of a graph of a person's size  AI-generated content may be incorrect. |  |
| age\_impact = 1.0  MR\_death\_impact = 0.8  MR\_lateintro = T - 2000  recruitment\_const = 0.003  comp\_impact = 0.9 | A graph of a graph of a person's body  AI-generated content may be incorrect. | A graph of time and time  AI-generated content may be incorrect. |
| age\_impact = 1.0  MR\_death\_impact = 1.0  MR\_lateintro = T - 1000  recruitment\_const = 0.003  comp\_impact = 0.9 | A graph of a graph of a person's size  AI-generated content may be incorrect. |  |
| A graph of a graph with numbers and a line of black and white  AI-generated content may be incorrect. | A graph of a number of objects  AI-generated content may be incorrect. |
| Pop 1  Age imp val = 1.0  MR imp val = 0.2  Pop 2  Age imp val = 1.0  MR imp val = 0.8 | Was run without maladaptation at the start to confirm initial pops overlapped  Q: Why does it drop at the start? |  |

A screenshot of a graph

AI-generated content may be incorrect.

## Change MR recruitment to ^2 instead of ^4

|  |  |  |
| --- | --- | --- |
| Pop 1  age\_impact = 1.0  MR\_death\_impact = 0.5  MR\_lateintro = T - 2000  recruitment\_const = 0.003  comp\_impact = 0.9 |  |  |
| Pop 2  age\_impact = 1.0  MR\_death\_impact = 0.05  MR\_lateintro = T - 2000  recruitment\_const = 0.003  comp\_impact = 0.9 |  |  |
| Pop 1  Age imp val = 1.0  MR imp val = 0.5  Pop 2  Age imp val = 1.0  MR imp val = 0.05 | Blue = runs without maladaptation events (running it solo)  Red = runs with maladaptation events (running both pops in conjunction)  Where for each side, red, pop 1, maladapts with pop 2 (triangle events):   * For the left side, pop 1, the maladapted pop is **pulled up** with the influence of pop2 (less resistant) * For the right side, pop 2 is **pulled** **down** with the influence of pop1 (more resistant) |  |



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Impact \_ MR | 0.10 | 0.12 | 0.14 | 0.16 | 0.18 |
|  |  |  |  |  | A graph with lines and numbers  AI-generated content may be incorrect. |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

**Adjusted recruitment to account for MR and age**

|  |  |
| --- | --- |
|  |  |

### Intervention

Data\_sim\_3

Altered mortality – age of interception indivs \*4 until mortality\_age\_shift/4 (~35)

#### Base:

* Recruitment adjustment = 0 & ^2
* MR=0.12
* MR introduced at 1000

**A graph of a person's size

AI-generated content may be incorrect.A graph of time and time

AI-generated content may be incorrect.A graph with a row of rectangular objects

AI-generated content may be incorrect.A graph with black lines and white text

AI-generated content may be incorrect.**

#### Intervention\_100-0.15-0.1\_T1025:

* Population size = 1000
* Init pop MR mean= 0.787; MR sd=0. 385
* Recruitment adjustment = 0 & ^2
* MR=0.12
* MR introduced at 1000
* intercept\_timepoint = 1025
* Dropped mean MR from 0.4468093 -> 0.4385565
* intercept\_indiv = 100
* intercept\_MR\_mean = 0.15
* intercept\_MR\_sd = 0.1

# A tibble: 2 × 2

Run min\_pop\_size

*<chr>* *<dbl>*

1 Base 1362.

2 Resistance Intervention 1598.

A screenshot of a graph

AI-generated content may be incorrect.

A comparison of a graph

AI-generated content may be incorrect.

#### Intervention\_300-0.15-0.1\_T1025:

* Population size = 1000
* Init pop MR mean= 0.787; MR sd=0. 385
* Recruitment adjustment = 0 & ^2
* MR=0.12
* MR introduced at 1000
* intercept\_timepoint = 1025
  + Dropped mean MR from 0.4468093 -> 0.4235052
* intercept\_indiv = 300
* intercept\_MR\_mean = 0.15
* intercept\_MR\_sd = 0.1

# A tibble: 2 × 2

Run min\_pop\_size

*<chr>* *<dbl>*

1 Base 1362.

2 Resistance Intervention 1222.

A graph of a graph

AI-generated content may be incorrect.A comparison of a graph

AI-generated content may be incorrect.

#### Intervention\_300-0.10-0.05\_T1025:

* Population size = 1000
* Init pop MR mean= 0.787; MR sd=0. 385
* Recruitment adjustment = 0 & ^2
* MR=0.12
* MR introduced at 1000
* intercept\_timepoint = 1025
  + Dropped mean MR from 0.499 -> 0.4718
* intercept\_indiv = 300
* intercept\_MR\_mean = 0.10
* intercept\_MR\_sd = 0.05

# A tibble: 2 × 2

Run min\_pop\_size

*<chr>* *<dbl>*

1 Base 1362.

2 Resistance Intervention 1470.

A graph of a graph of a graph

AI-generated content may be incorrect.

A comparison of a graph

AI-generated content may be incorrect.

#### Intervention\_300-0.15-0.10\_T1050:

* Population size = 1000
* Init pop MR mean= 0.787; MR sd=0. 385
* Recruitment adjustment = 0 & ^2
* MR=0.12
* MR introduced at 1000
* intercept\_timepoint = 1050
  + Dropped mean MR from 0.4458399 -> 0.4202595
* intercept\_indiv = 300
* intercept\_MR\_mean = 0.15
* intercept\_MR\_sd = 0.10

> live\_size\_wind\_mean %>%

+ group\_by(Run) %>%

+ summarise(min\_pop\_size = min(mean\_wind\_size))

# A tibble: 2 × 2

Run min\_pop\_size

*<chr>* *<dbl>*

1 Base 1362.

2 Resistance Intervention 1367.

A screenshot of a graph

AI-generated content may be incorrect.

A comparison of a graph

AI-generated content may be incorrect.

#### Intervention\_300-0.15-0.10\_T1025:

* Population size = 1000
* Init pop MR mean= 0.787; MR sd=0. 385
* Recruitment adjustment = 0 & ^2
* MR=0.12
* MR introduced at 1000
* intercept\_timepoint = 1025
  + Dropped mean MR from 0.4468093 -> 0.4235052
* intercept\_indiv = 300
* intercept\_MR\_mean = 0.15
* intercept\_MR\_sd = 0.1

# A tibble: 2 × 2

Run min\_pop\_size

*<chr>* *<dbl>*

1 Base 1362.

2 Resistance Intervention 1192.

A screenshot of a graph

AI-generated content may be incorrect.

A comparison of a graph

AI-generated content may be incorrect.

#### Intervention\_500-0.15-0.10\_T1025:

* Population size = 1000
* Init pop MR mean= 0.787; MR sd=0. 385
* Recruitment adjustment = 0 & ^2
* MR=0.12
* MR introduced at 1000
* intercept\_timepoint = 1025
  + Dropped mean MR from 0.4468093 -> 0.4102694
* intercept\_indiv = 500
  + After addition (*N =* 4035)
* intercept\_MR\_mean = 0.15
* intercept\_MR\_sd = 0.1

# A tibble: 2 × 2

Run min\_pop\_size

*<chr>* *<dbl>*

1 Base 1362.

2 Resistance Intervention 1635.

A graph of a graph

AI-generated content may be incorrect.

A comparison of a graph

AI-generated content may be incorrect.

#### Intervention\_1000-0.15-0.1\_T1025:

* Population size = 1000
* Init pop MR mean= 0.787; MR sd=0. 385
* Recruitment adjustment = 0 & ^2
* MR=0.12
* MR introduced at 1000
* intercept\_timepoint = 1025
  + Dropped mean MR from 0.4468093 -> 0.3825454
* intercept\_indiv = 1000
  + After addition (*N =* 4535)
* intercept\_MR\_mean = 0.15
* intercept\_MR\_sd = 0.1

# A tibble: 2 × 2

Run min\_pop\_size

*<chr>* *<dbl>*

1 Base 1362.

2 Resistance Intervention 1845.

A graph of a graph of a graph

AI-generated content may be incorrect.

A comparison of a graph

AI-generated content may be incorrect.

#### Intervention\_300-0.15-0.1\_T1025\_PopSize4000:

* Population size = 4000
* Init pop MR mean= 0.787; MR sd=0. 385
* Recruitment adjustment = 0 & ^2
* MR=0.12
* MR introduced at 1000
* intercept\_timepoint = 1025
  + Dropped mean MR from 0.4468093 -> 0.3825454
* intercept\_indiv = 300
* intercept\_MR\_mean = 0.15
* intercept\_MR\_sd = 0.1

# A tibble: 2 × 2

Run min\_pop\_size

*<chr>* *<dbl>*

1 Base 6280.

2 Resistance Intervention 7039.

A graph of a graph

AI-generated content may be incorrect.

A comparison of a graph

AI-generated content may be incorrect.

**Reducing recruitment: to 0.0025 from 0.003**

A graph of a graph of a graph

AI-generated content may be incorrect.

#### Intervention\_300-0.15-0.1\_T1025 \_ResistInitMR:

* Population size = 1000
* Init pop MR mean= 0.25; MR sd=0. 1
* Recruitment adjustment = 0 & ^2
* MR=0.12
* MR introduced at 1000
* intercept\_timepoint = 1025
  + Dropped mean MR from 0.243588 -> 0.2376324
* intercept\_indiv = 300
* intercept\_MR\_mean = 0.15
* intercept\_MR\_sd = 0.1

> live\_size\_wind\_mean %>%

+ group\_by(Run) %>%

+ summarise(min\_pop\_size = min(mean\_wind\_size))

# A tibble: 2 × 2

Run min\_pop\_size

*<chr>* *<dbl>*

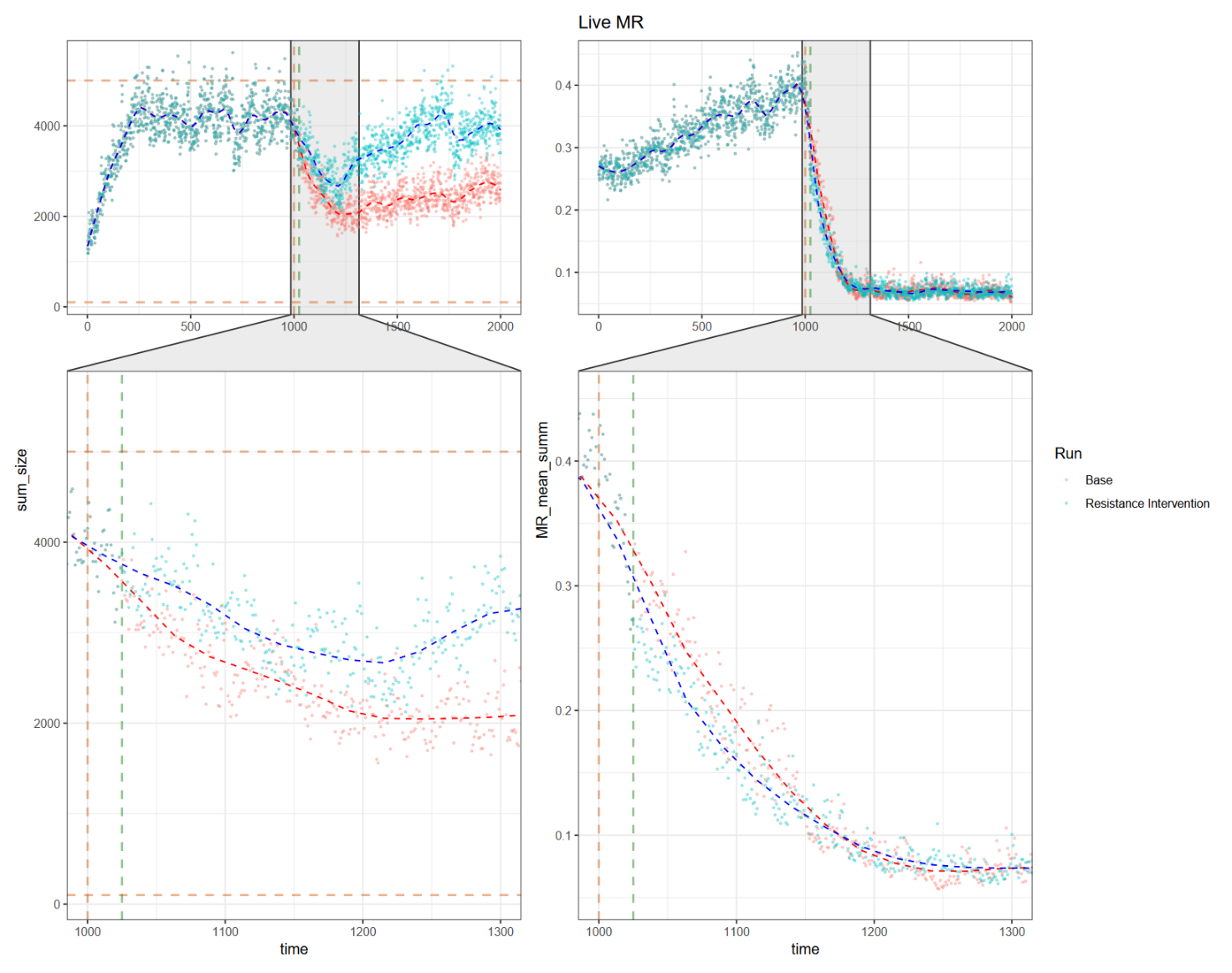
1 Base 2011.

2 Resistance Intervention 2485.

E.g., 0.3 recruit

A graph of a number of objects

AI-generated content may be incorrect.

**A comparison of a graph

AI-generated content may be incorrect.**

#### Intervention\_300-0.15-0.1\_T1025\_Rm mortality reduction\_ ResistInitMR:

* Population size = 1000
* Init pop MR mean= 0.25; MR sd=0. 1
* Recruitment adjustment = 0 & ^2
* MR=0.12
* MR introduced at 1000
* intercept\_timepoint = 1025
  + Dropped mean MR from 0.2764773 -> 0.2684228
* intercept\_indiv = 300
* intercept\_MR\_mean = 0.15
* intercept\_MR\_sd = 0.1
* intercept\_reducMort = F

# A tibble: 2 × 2

Run min\_pop\_size

*<chr>* *<dbl>*

1 Base 1362.

2 Resistance Intervention 1845.

A screenshot of a graph

AI-generated content may be incorrect.

A comparison of a window size chart

AI-generated content may be incorrect.

#### Intervention\_300-0.8-0.1\_T1050:

* Population size = 1000
* Init pop MR mean= 0.787; MR sd=0. 385
* Recruitment adjustment = 0 & ^2
* MR=0.12
* MR introduced at 1000
* intercept\_timepoint = 1050
  + Mean MR from 0.4468093 -> 0.4741063
* intercept\_indiv = 300
* intercept\_MR\_mean = 0.80
* intercept\_MR\_sd = 0.10
* intercept\_reducMort = F

> live\_size\_wind\_mean %>%

+ group\_by(Run) %>%

+ summarise(min\_pop\_size = min(mean\_wind\_size))

# A tibble: 2 × 2

Run min\_pop\_size

*<chr>* *<dbl>*

1 Base 1362.

2 Resistance Intervention 1330.

A graph of a graph

AI-generated content may be incorrect.

A comparison of a graph

AI-generated content may be incorrect.

A graph of a person with histogram

AI-generated content may be incorrect.

## Change MR recruitment to adjust for MR and age; MR recruited return back to ^4

**Base**

|  |  |  |
| --- | --- | --- |
| ## Input parameters for high MR pressure sites  ## Population parameters  population\_size = 1000  population\_carrying\_capacity = population\_size\*5  population\_minimum\_size = population\_size/10  MR\_mean = 0.787 # From actual genotype data  MR\_sd = 0.385  disturbance\_impact\_val=5 # impacts base age & MR death factor and recruitment constant  ## Mortality parameters  age\_impact = 1.0 # scaled age inflicted increase - from 0 to 1, should add to 1 with MR impact val  mortality\_age\_shift = 150 # at what age does increases in age increase chance of death  MR\_imp = T # toggle on/off for MR inflicted death increase  MR\_death\_impact = 0.20 # linear scaled MR inflicted death increase - from 0 to 1, should add to 1 with age impact val  MR\_age\_impact = 20 # scaled impact of age (ages / MR\_age\_impact\_val) on MR inflicted death increase  MR\_lateintro = T  MR\_timepoint = 1000 # time point when MR is introduced  ## Recruitment parameters  recruitment\_const = 0.003 # base constant for chance of recruitment  recruitment\_age = 7 # age to begin recruiting  recruitment\_mean = 100 # mean for PDF of normal distribution for number of recruited individuals  recruitment\_sd = recruitment\_mean/2 # standard deviation of number of recruited individuals  age\_rec\_toggle = TRUE # Takes the complimentary of the age fraction to reduce recruitment mean according to size (larger = closer to 1)  age\_recruit\_impact\_value = 0.5 # Range from 0.01-1. Takes the exponential of this value, the higher this value, the steeper the penalisation  rec\_age\_shift = 100 # age shift, lower than this age recruitment for the individual is penalised  MR\_rec\_toggle = F # toggle on/off of MR affect on recruitment  MR\_recruit\_impact = 0.5 # impact of MR on recruitment, a multiplier of the individual MR to reduce recruitment chance  MR\_rec\_adj = 0 # Shift mean of MR status of recruited individuals  ## Intervention parameters  intercept\_togg = F |  |  |
| ## Input parameters for high MR pressure sites  ## Population parameters  population\_size = 1000  population\_carrying\_capacity = population\_size\*5  population\_minimum\_size = population\_size/10  MR\_mean = 0.787 # From actual genotype data  MR\_sd = 0.385  disturbance\_impact\_val=5 # impacts base age & MR death factor and recruitment constant  ## Mortality parameters  age\_impact = 1.0 # scaled age inflicted increase - from 0 to 1, should add to 1 with MR impact val  mortality\_age\_shift = 150 # at what age does increases in age increase chance of death  MR\_imp = T # toggle on/off for MR inflicted death increase  MR\_death\_impact = 0.12 # linear scaled MR inflicted death increase - from 0 to 1, should add to 1 with age impact val  MR\_age\_impact = 20 # scaled impact of age (ages / MR\_age\_impact\_val) on MR inflicted death increase  MR\_lateintro = T  MR\_timepoint = 1000 # time point when MR is introduced  ## Recruitment parameters  recruitment\_const = 0.003 # base constant for chance of recruitment  recruitment\_age = 7 # age to begin recruiting  recruitment\_mean = 100 # mean for PDF of normal distribution for number of recruited individuals  recruitment\_sd = recruitment\_mean/2 # standard deviation of number of recruited individuals  age\_rec\_toggle = TRUE # Takes the complimentary of the age fraction to reduce recruitment mean according to size (larger = closer to 1)  age\_recruit\_impact\_value = 0.5 # Range from 0.01-1. Takes the exponential of this value, the higher this value, the steeper the penalisation  rec\_age\_shift = 100 # age shift, lower than this age recruitment for the individual is penalised  MR\_rec\_toggle = F # toggle on/off of MR affect on recruitment  MR\_recruit\_impact = 0.5 # impact of MR on recruitment, a multiplier of the individual MR to reduce recruitment chance  MR\_rec\_adj = 0 # Shift mean of MR status of recruited individuals  ## Intervention parameters  intercept\_togg = F |  |  |
| ## Input parameters for high MR pressure sites  ## Population parameters  population\_size = 1000  population\_carrying\_capacity = population\_size\*5  population\_minimum\_size = population\_size/10  MR\_mean = 0.787 # From actual genotype data  MR\_sd = 0.385  disturbance\_impact\_val=5 # impacts base age & MR death factor and recruitment constant  ## Mortality parameters  age\_impact = 1.0 # scaled age inflicted increase - from 0 to 1, should add to 1 with MR impact val  mortality\_age\_shift = 150 # at what age does increases in age increase chance of death  MR\_imp = T # toggle on/off for MR inflicted death increase  MR\_death\_impact = 0.12 # linear scaled MR inflicted death increase - from 0 to 1, should add to 1 with age impact val  MR\_age\_impact = 20 # scaled impact of age (ages / MR\_age\_impact\_val) on MR inflicted death increase  MR\_lateintro = T  MR\_timepoint = 1000 # time point when MR is introduced  ## Recruitment parameters  recruitment\_const = 0.003 # base constant for chance of recruitment  recruitment\_age = 7 # age to begin recruiting  recruitment\_mean = 100 # mean for PDF of normal distribution for number of recruited individuals  recruitment\_sd = recruitment\_mean/2 # standard deviation of number of recruited individuals  age\_rec\_toggle = TRUE # Takes the complimentary of the age fraction to reduce recruitment mean according to size (larger = closer to 1)  age\_recruit\_impact\_value = 0.5 # Range from 0.01-1. Takes the exponential of this value, the higher this value, the steeper the penalisation  rec\_age\_shift = 100 # age shift, lower than this age recruitment for the individual is penalised  MR\_rec\_toggle = F # toggle on/off of MR affect on recruitment  MR\_recruit\_impact = 0.5 # impact of MR on recruitment, a multiplier of the individual MR to reduce recruitment chance  MR\_rec\_adj = 0 # Shift mean of MR status of recruited individuals  ## Intervention parameters  intercept\_togg = F  ## Disturbance parameters (ranges from super small to big impacts)  **dist\_imp = F # Turn on and off disturbance presence** |  |  |
| ## Input parameters for high MR pressure sites  ## Population parameters  population\_size = 1000  population\_carrying\_capacity = population\_size\*5  population\_minimum\_size = population\_size/10  MR\_mean = 0.787 # From actual genotype data  MR\_sd = 0.385  disturbance\_impact\_val=5 # impacts base age & MR death factor and recruitment constant  ## Mortality parameters  age\_impact = 1.0 # scaled age inflicted increase - from 0 to 1, should add to 1 with MR impact val  mortality\_age\_shift = 150 # at what age does increases in age increase chance of death  MR\_imp = T # toggle on/off for MR inflicted death increase  MR\_death\_impact = 0.12 # linear scaled MR inflicted death increase - from 0 to 1, should add to 1 with age impact val  MR\_age\_impact = 20 # scaled impact of age (ages / MR\_age\_impact\_val) on MR inflicted death increase  MR\_lateintro = T  MR\_timepoint = 1000 # time point when MR is introduced  ## Recruitment parameters  recruitment\_const = 0.003 # base constant for chance of recruitment  recruitment\_age = 7 # age to begin recruiting  recruitment\_mean = 100 # mean for PDF of normal distribution for number of recruited individuals  recruitment\_sd = recruitment\_mean/2 # standard deviation of number of recruited individuals  age\_rec\_toggle = TRUE # Takes the complimentary of the age fraction to reduce recruitment mean according to size (larger = closer to 1)  age\_recruit\_impact\_value = 0.5 # Range from 0.01-1. Takes the exponential of this value, the higher this value, the steeper the penalisation  rec\_age\_shift = 100 # age shift, lower than this age recruitment for the individual is penalised  MR\_rec\_toggle = F # toggle on/off of MR affect on recruitment  **MR\_recruit\_impact = 0.75 # impact of MR on** recruitment, a multiplier of the individual MR to reduce recruitment chance  MR\_rec\_adj = 0 # Shift mean of MR status of recruited individuals  ## Intervention parameters  intercept\_togg = F  ## Disturbance parameters (ranges from super small to big impacts)  dist\_imp = F # Turn on and off disturbance presence  ^4 -> ^2 MR inheritance |  |  |
| ## Input parameters for high MR pressure sites  ## Population parameters  population\_size = 1000  population\_carrying\_capacity = population\_size\*5  population\_minimum\_size = population\_size/10  MR\_mean = 0.787 # From actual genotype data  MR\_sd = 0.385  disturbance\_impact\_val=5 # impacts base age & MR death factor and recruitment constant  ## Mortality parameters  age\_impact = 1.0 # scaled age inflicted increase - from 0 to 1, should add to 1 with MR impact val  mortality\_age\_shift = 150 # at what age does increases in age increase chance of death  MR\_imp = T # toggle on/off for MR inflicted death increase  MR\_death\_impact = 0.15 # linear scaled MR inflicted death increase - from 0 to 1, should add to 1 with age impact val  MR\_age\_impact = 20 # scaled impact of age (ages / MR\_age\_impact\_val) on MR inflicted death increase  MR\_lateintro = T  MR\_timepoint = 1000 # time point when MR is introduced  ## Recruitment parameters  recruitment\_const = 0.003 # base constant for chance of recruitment  recruitment\_age = 7 # age to begin recruiting  recruitment\_mean = 100 # mean for PDF of normal distribution for number of recruited individuals  recruitment\_sd = recruitment\_mean/2 # standard deviation of number of recruited individuals  age\_rec\_toggle = TRUE # Takes the complimentary of the age fraction to reduce recruitment mean according to size (larger = closer to 1)  age\_recruit\_impact\_value = 0.5 # Range from 0.01-1. Takes the exponential of this value, the higher this value, the steeper the penalisation  rec\_age\_shift = 100 # age shift, lower than this age recruitment for the individual is penalised  MR\_rec\_toggle = F # toggle on/off of MR affect on recruitment  **MR\_recruit\_impact = 0.75 # impact of MR on** recruitment, a multiplier of the individual MR to reduce recruitment chance  MR\_rec\_adj = 0 # Shift mean of MR status of recruited individuals  ## Intervention parameters  intercept\_togg = F  ## Disturbance parameters (ranges from super small to big impacts)  dist\_imp = F # Turn on and off disturbance presence  ^4 -> ^2 MR inheritance |  |  |
| ## Input parameters for high MR pressure sites  ## Population parameters  population\_size = 1000  population\_carrying\_capacity = population\_size\*5  population\_minimum\_size = population\_size/10  MR\_mean = 0.787 # From actual genotype data  MR\_sd = 0.385  disturbance\_impact\_val=5 # impacts base age & MR death factor and recruitment constant  ## Mortality parameters  age\_impact = 1.0 # scaled age inflicted increase - from 0 to 1, should add to 1 with MR impact val  mortality\_age\_shift = 150 # at what age does increases in age increase chance of death  MR\_imp = T # toggle on/off for MR inflicted death increase  MR\_death\_impact = 0.20 # linear scaled MR inflicted death increase - from 0 to 1, should add to 1 with age impact val  MR\_age\_impact = 20 # scaled impact of age (ages / MR\_age\_impact\_val) on MR inflicted death increase  MR\_lateintro = T  MR\_timepoint = 1000 # time point when MR is introduced  ## Recruitment parameters  recruitment\_const = 0.003 # base constant for chance of recruitment  recruitment\_age = 7 # age to begin recruiting  recruitment\_mean = 100 # mean for PDF of normal distribution for number of recruited individuals  recruitment\_sd = recruitment\_mean/2 # standard deviation of number of recruited individuals  age\_rec\_toggle = TRUE # Takes the complimentary of the age fraction to reduce recruitment mean according to size (larger = closer to 1)  age\_recruit\_impact\_value = 0.5 # Range from 0.01-1. Takes the exponential of this value, the higher this value, the steeper the penalisation  rec\_age\_shift = 100 # age shift, lower than this age recruitment for the individual is penalised  MR\_rec\_toggle = F # toggle on/off of MR affect on recruitment  **MR\_recruit\_impact = 0.75 # impact of MR on** recruitment, a multiplier of the individual MR to reduce recruitment chance  MR\_rec\_adj = 0 # Shift mean of MR status of recruited individuals  ## Intervention parameters  intercept\_togg = F  ## Disturbance parameters (ranges from super small to big impacts)  dist\_imp = F # Turn on and off disturbance presence  ^4 -> ^2 MR inheritance |  |  |
| ## Input parameters for high MR pressure sites  ## Population parameters  population\_size = 1000  population\_carrying\_capacity = population\_size\*5  population\_minimum\_size = population\_size/10  MR\_mean = 0.787 # From actual genotype data  MR\_sd = 0.385  disturbance\_impact\_val=5 # impacts base age & MR death factor and recruitment constant  ## Mortality parameters  age\_impact = 1.0 # scaled age inflicted increase - from 0 to 1, should add to 1 with MR impact val  mortality\_age\_shift = 150 # at what age does increases in age increase chance of death  MR\_imp = T # toggle on/off for MR inflicted death increase  MR\_death\_impact = 0.20 # linear scaled MR inflicted death increase - from 0 to 1, should add to 1 with age impact val  MR\_age\_impact = 20 # scaled impact of age (ages / MR\_age\_impact\_val) on MR inflicted death increase  MR\_lateintro = T  MR\_timepoint = 1000 # time point when MR is introduced  ## Recruitment parameters  recruitment\_const = 0.003 # base constant for chance of recruitment  recruitment\_age = 7 # age to begin recruiting  recruitment\_mean = 100 # mean for PDF of normal distribution for number of recruited individuals  recruitment\_sd = recruitment\_mean/2 # standard deviation of number of recruited individuals  age\_rec\_toggle = TRUE # Takes the complimentary of the age fraction to reduce recruitment mean according to size (larger = closer to 1)  age\_recruit\_impact\_value = 0.5 # Range from 0.01-1. Takes the exponential of this value, the higher this value, the steeper the penalisation  rec\_age\_shift = 100 # age shift, lower than this age recruitment for the individual is penalised  MR\_rec\_toggle = F # toggle on/off of MR affect on recruitment  **MR\_recruit\_impact = 0.75 # impact of MR on** recruitment, a multiplier of the individual MR to reduce recruitment chance  MR\_rec\_adj = 0 # Shift mean of MR status of recruited individuals  ## Intervention parameters  intercept\_togg = F  ## Disturbance parameters (ranges from super small to big impacts)  dist\_imp = F # Turn on and off disturbance presence  ^4 -> ^2 MR inheritance |  |  |

**Intervention**

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| ## Input parameters for high MR pressure sites  ## Population parameters  population\_size = 1000  population\_carrying\_capacity = population\_size\*5  population\_minimum\_size = population\_size/10  MR\_mean = 0.787 # From actual genotype data  MR\_sd = 0.385  disturbance\_impact\_val=5 # impacts base age & MR death factor and recruitment constant  ## Mortality parameters  age\_impact = 1.0 # scaled age inflicted increase - from 0 to 1, should add to 1 with MR impact val  mortality\_age\_shift = 150 # at what age does increases in age increase chance of death  MR\_imp = T # toggle on/off for MR inflicted death increase  MR\_death\_impact = 0.12 # linear scaled MR inflicted death increase - from 0 to 1, should add to 1 with age impact val  MR\_age\_impact = 20 # scaled impact of age (ages / MR\_age\_impact\_val) on MR inflicted death increase  MR\_lateintro = T  MR\_timepoint = 1000 # time point when MR is introduced  ## Recruitment parameters  recruitment\_const = 0.003 # base constant for chance of recruitment  recruitment\_age = 7 # age to begin recruiting  recruitment\_mean = 100 # mean for PDF of normal distribution for number of recruited individuals  recruitment\_sd = recruitment\_mean/2 # standard deviation of number of recruited individuals  age\_rec\_toggle = TRUE # Takes the complimentary of the age fraction to reduce recruitment mean according to size (larger = closer to 1)  age\_recruit\_impact\_value = 0.5 # Range from 0.01-1. Takes the exponential of this value, the higher this value, the steeper the penalisation  rec\_age\_shift = 100 # age shift, lower than this age recruitment for the individual is penalised  MR\_rec\_toggle = F # toggle on/off of MR affect on recruitment  MR\_recruit\_impact = 0.5 # impact of MR on recruitment, a multiplier of the individual MR to reduce recruitment chance  MR\_rec\_adj = 0 # Shift mean of MR status of recruited individuals  ## Intervention parameters  intercept\_togg = T  intercept\_timepoint = 1025  intercept\_indiv = 300  intercept\_MR\_mean = 0.15 # (bottom third)  intercept\_MR\_sd = 0.1  intercept\_reducMort = T | MR mean 0.6943643 -> 0.6597317  # A tibble: 2 × 2  Run min\_pop\_size  <chr> <dbl>  1 Base 1447.  2 Resistance Intervention 1383. |
| ## Intervention parameters  intercept\_togg = T  intercept\_timepoint = 1025  intercept\_indiv = 300  intercept\_MR\_mean = 0.75 # (top quarter)  intercept\_MR\_sd = 0.1  intercept\_reducMort = T | MR 0.567441 -> 0.5811666 |
| ## Input parameters for high MR pressure sites  ## Population parameters  population\_size = 1000  population\_carrying\_capacity = population\_size\*5  population\_minimum\_size = population\_size/10  MR\_mean = 0.787 # From actual genotype data  MR\_sd = 0.385  disturbance\_impact\_val=5 # impacts base age & MR death factor and recruitment constant  ## Mortality parameters  age\_impact = 1.0 # scaled age inflicted increase - from 0 to 1, should add to 1 with MR impact val  mortality\_age\_shift = 150 # at what age does increases in age increase chance of death  MR\_imp = T # toggle on/off for MR inflicted death increase  MR\_death\_impact = 0.12 # linear scaled MR inflicted death increase - from 0 to 1, should add to 1 with age impact val  MR\_age\_impact = 20 # scaled impact of age (ages / MR\_age\_impact\_val) on MR inflicted death increase  MR\_lateintro = T  MR\_timepoint = 1000 # time point when MR is introduced  ## Recruitment parameters  recruitment\_const = 0.003 # base constant for chance of recruitment  recruitment\_age = 7 # age to begin recruiting  recruitment\_mean = 100 # mean for PDF of normal distribution for number of recruited individuals  recruitment\_sd = recruitment\_mean/2 # standard deviation of number of recruited individuals  age\_rec\_toggle = TRUE # Takes the complimentary of the age fraction to reduce recruitment mean according to size (larger = closer to 1)  age\_recruit\_impact\_value = 0.5 # Range from 0.01-1. Takes the exponential of this value, the higher this value, the steeper the penalisation  rec\_age\_shift = 100 # age shift, lower than this age recruitment for the individual is penalised  MR\_rec\_toggle = F # toggle on/off of MR affect on recruitment  **MR\_recruit\_impact = 0.75 # impact of MR on** recruitment, a multiplier of the individual MR to reduce recruitment chance  MR\_rec\_adj = 0 # Shift mean of MR status of recruited individuals  ## Intervention parameters  intercept\_togg = T  intercept\_timepoint = 1025  intercept\_indiv = 300  intercept\_MR\_mean = 0.15  intercept\_MR\_sd = 0.1  intercept\_reducMort = T  ## Disturbance parameters (ranges from super small to big impacts)  dist\_imp = F # Turn on and off disturbance presence  ^4 -> ^2 MR inheritance | MR 0.4649687 -> 0.4439846  # A tibble: 2 × 2  Run min\_pop\_size  <chr> <dbl>  1 Base 1683.  2 Resistance Intervention 2055. |
| ## Input parameters for high MR pressure sites  ## Population parameters  population\_size = 1000  population\_carrying\_capacity = population\_size\*5  population\_minimum\_size = population\_size/10  MR\_mean = 0.787 # From actual genotype data  MR\_sd = 0.385  disturbance\_impact\_val=5 # impacts base age & MR death factor and recruitment constant  ## Mortality parameters  age\_impact = 1.0 # scaled age inflicted increase - from 0 to 1, should add to 1 with MR impact val  mortality\_age\_shift = 150 # at what age does increases in age increase chance of death  MR\_imp = T # toggle on/off for MR inflicted death increase  **MR\_death\_impact = 0.20 # linear scaled MR inflicted death** increase - from 0 to 1, should add to 1 with age impact val  MR\_age\_impact = 20 # scaled impact of age (ages / MR\_age\_impact\_val) on MR inflicted death increase  MR\_lateintro = T  MR\_timepoint = 1000 # time point when MR is introduced  ## Recruitment parameters  recruitment\_const = 0.003 # base constant for chance of recruitment  recruitment\_age = 7 # age to begin recruiting  recruitment\_mean = 100 # mean for PDF of normal distribution for number of recruited individuals  recruitment\_sd = recruitment\_mean/2 # standard deviation of number of recruited individuals  age\_rec\_toggle = TRUE # Takes the complimentary of the age fraction to reduce recruitment mean according to size (larger = closer to 1)  age\_recruit\_impact\_value = 0.5 # Range from 0.01-1. Takes the exponential of this value, the higher this value, the steeper the penalisation  rec\_age\_shift = 100 # age shift, lower than this age recruitment for the individual is penalised  MR\_rec\_toggle = F # toggle on/off of MR affect on recruitment  MR\_recruit\_impact = 0.75 # impact of MR on recruitment, a multiplier of the individual MR to reduce recruitment chance  MR\_rec\_adj = 0 # Shift mean of MR status of recruited individuals  ## Intervention parameters  intercept\_togg = T  intercept\_timepoint = 1025  intercept\_indiv = 300  intercept\_MR\_mean = 0.15  intercept\_MR\_sd = 0.1  intercept\_reducMort = T  ## Disturbance parameters (ranges from super small to big impacts)  dist\_imp = F # Turn on and off disturbance presence  ^4 -> ^2 MR inheritance | MR 0. 0.4254523 -> 0. 0.4070457  # A tibble: 2 × 2  Run min\_pop\_size  <chr> <dbl>  1 Base 1290.  2 Resistance Intervention 2013. |
| ## Input parameters for high MR pressure sites  ## Population parameters  population\_size = 1000  population\_carrying\_capacity = population\_size\*5  population\_minimum\_size = population\_size/10  MR\_mean = 0.787 # From actual genotype data  MR\_sd = 0.385  disturbance\_impact\_val=5 # impacts base age & MR death factor and recruitment constant  ## Mortality parameters  age\_impact = 1.0 # scaled age inflicted increase - from 0 to 1, should add to 1 with MR impact val  mortality\_age\_shift = 150 # at what age does increases in age increase chance of death  MR\_imp = T # toggle on/off for MR inflicted death increase  **MR\_death\_impact = 0.20 # linear scaled MR inflicted death** increase - from 0 to 1, should add to 1 with age impact val  MR\_age\_impact = 20 # scaled impact of age (ages / MR\_age\_impact\_val) on MR inflicted death increase  MR\_lateintro = T  MR\_timepoint = 1000 # time point when MR is introduced  ## Recruitment parameters  recruitment\_const = 0.003 # base constant for chance of recruitment  recruitment\_age = 7 # age to begin recruiting  recruitment\_mean = 100 # mean for PDF of normal distribution for number of recruited individuals  recruitment\_sd = recruitment\_mean/2 # standard deviation of number of recruited individuals  age\_rec\_toggle = TRUE # Takes the complimentary of the age fraction to reduce recruitment mean according to size (larger = closer to 1)  age\_recruit\_impact\_value = 0.5 # Range from 0.01-1. Takes the exponential of this value, the higher this value, the steeper the penalisation  rec\_age\_shift = 100 # age shift, lower than this age recruitment for the individual is penalised  MR\_rec\_toggle = F # toggle on/off of MR affect on recruitment  MR\_recruit\_impact = 0.75 # impact of MR on recruitment, a multiplier of the individual MR to reduce recruitment chance  MR\_rec\_adj = 0 # Shift mean of MR status of recruited individuals  ## Intervention parameters  intercept\_togg = T  intercept\_timepoint = 1025  intercept\_indiv = 300  intercept\_MR\_mean = 0.15  intercept\_MR\_sd = 0.1  intercept\_reducMort = T  ## Disturbance parameters (ranges from super small to big impacts)  dist\_imp = F # Turn on and off disturbance presence  ^4 -> ^2 MR inheritance | MR 0.4462213 -> 0.421469  # A tibble: 2 × 2  Run min\_pop\_size  <chr> <dbl>  1 Base 996.  2 Resistance Intervention 1371. |