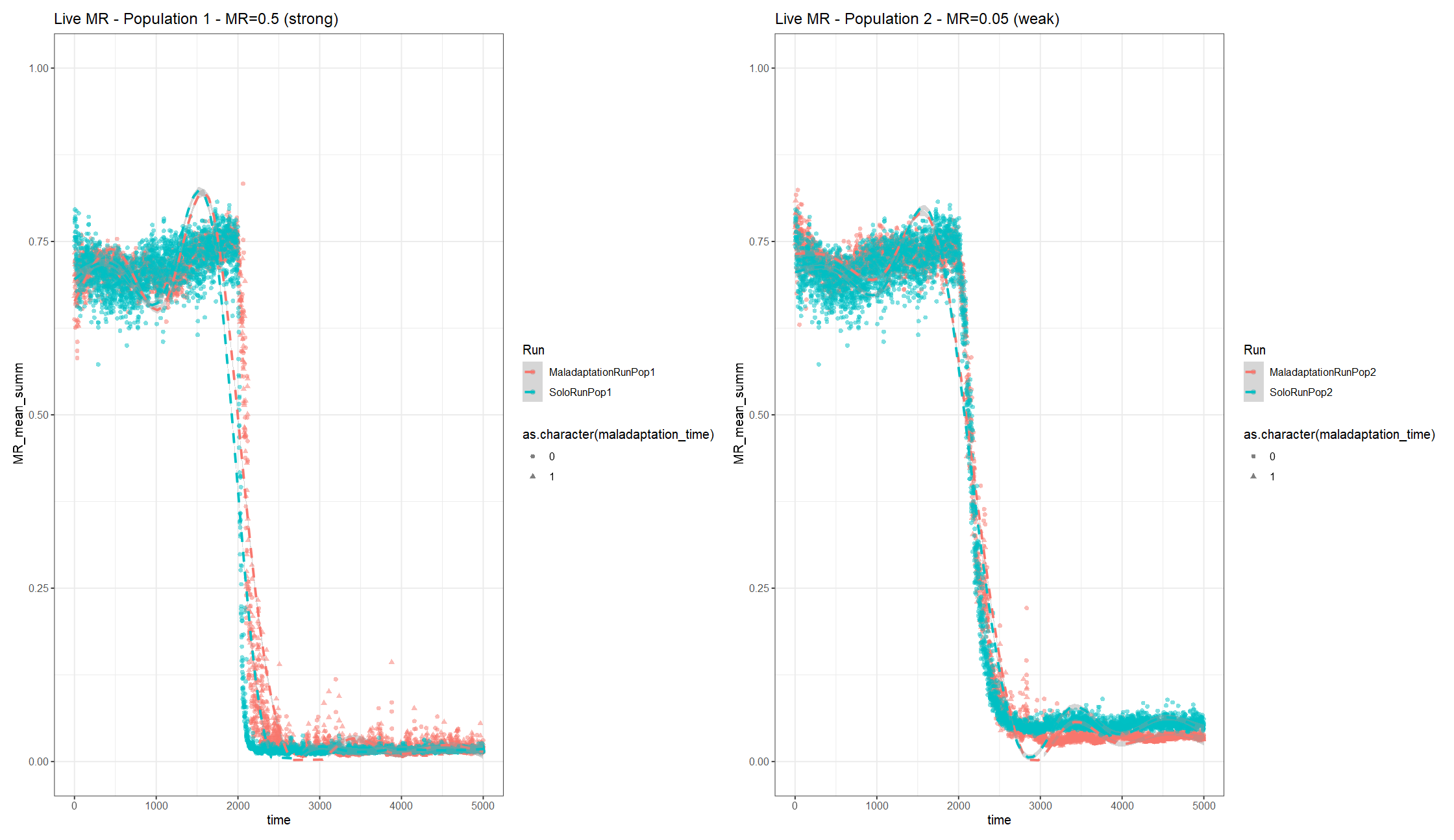
Plots below, **after** changing mortality

|  |  |  |  |
| --- | --- | --- | --- |
| **Recruitment score of 0.0022** | | | |
| Age imp val =1  MR = OFF  Recruitment rate of 0.0022 |  |  |  |
| Age imp val =1  MR = 1  Pop\_init  MR\_mean = 0.653 MR\_sd = 0.366  Recruitment rate of 0.0022 |  |  | Recruitment cant keep up as age impact + Mr impact are compounded (see age & MR = 0.5 at late intro) |
| Age imp val = 2  MR = 1  Pop\_init  MR\_mean = 0.653 MR\_sd = 0.366  Recruitment rate of 0. 0022 | Error: All dead at time 174 |  |  |
| Age imp val = 1  MR = 0.5  Pop\_init  MR\_mean = 0.653 MR\_sd = 0.366  Recruitment rate of 0. 0022 |  |  |  |
|  |  |  |  |
| Age imp val = 1.5  MR = 0.5  Pop\_init  MR\_mean = 0.653 MR\_sd = 0.366  Recruitment rate of 0.005 | Error: All dead at time 283 |  |  |
| Age imp val = 1  MR = 0.1  Pop\_init  MR\_mean = 0.653 MR\_sd = 0.366  Recruitment rate of 0. 0022 |  |  |  |
| Age imp val = 1  MR = 0.01  Pop\_init  MR\_mean = 0.653 MR\_sd = 0.366  Recruitment rate of 0. 0022 |  |  |  |
| Changing MR age impact | | | |
| Age imp val =1  MR = 1  Turned off MR age impact  Pop\_init  MR\_mean = 0.653 MR\_sd = 0.366  Recruitment rate of 0.005 | All dead at time 64 |  | Increased mortality as MR age impact reduces MR score overall |
| Late MR intro | | | |
| Age imp val =1  MR = 1 – late intro at TP=1000  Pop\_init  MR\_mean = 0.653 MR\_sd = 0.366  Recruitment rate of 0. 0022 |  |  |  |
| Age imp val = 0.5  MR = 0.5 – late intro at TP=1000  Pop\_init  MR\_mean = 0.653 MR\_sd = 0.366  Recruitment rate of 0. 0022 |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Recruitment score of 0.005** | | | |
| Age imp val =1  MR = OFF  Recruitment rate of 0.001 |  |  |  |
| Age imp val =1  MR = 1  Pop\_init  MR\_mean = 0.653 MR\_sd = 0.366  Recruitment rate of 0.005 |  |  | Final individual mortality rates (calculated by complementary probability of both) are punished by MR hitting 0, therefore lower than age |
| Age imp val = 2  MR = 1  Pop\_init  MR\_mean = 0.653 MR\_sd = 0.366  Recruitment rate of 0.005 | Error: All dead at time 198 |  |  |
| Age imp val = 1  MR = 0.5  Pop\_init  MR\_mean = 0.653 MR\_sd = 0.366  Recruitment rate of 0.005 |  |  |  |
| Age imp val = 1.5  MR = 0.5  Pop\_init  MR\_mean = 0.653 MR\_sd = 0.366  Recruitment rate of 0.005 | Error: All dead at time 313 |  |  |
| Age imp val = 1  MR = 0.1  Pop\_init  MR\_mean = 0.653 MR\_sd = 0.366  Recruitment rate of 0.005 |  |  |  |
| Age imp val = 1  MR = 0.01  Pop\_init  MR\_mean = 0.653 MR\_sd = 0.366  Recruitment rate of 0.005 |  |  |  |
| Changing MR age impact | | | |
| Age imp val =1  MR = 1  Turned off MR age impact  Pop\_init  MR\_mean = 0.653 MR\_sd = 0.366  Recruitment rate of 0.005 |  |  | Increased mortality as MR age impact reduces MR score overall |
| Late MR intro | | | |
| Age imp val =1  MR = 1 – late intro at TP=1000  Pop\_init  MR\_mean = 0.653 MR\_sd = 0.366  Recruitment rate of 0.005 |  |  |  |
| Age imp val =1  MR = 0.5 – late intro at TP=1000  Pop\_init  MR\_mean = 0.653 MR\_sd = 0.366  Recruitment rate of 0.005 |  |  |  |
| Age imp val =1  MR = 0.1 – late intro at TP=1000  Pop\_init  MR\_mean = 0.653 MR\_sd = 0.366  Recruitment rate of 0.005 |  |  | Stabilises at a lower MR timepoint regardless because of higher inheritability of MR resistance |

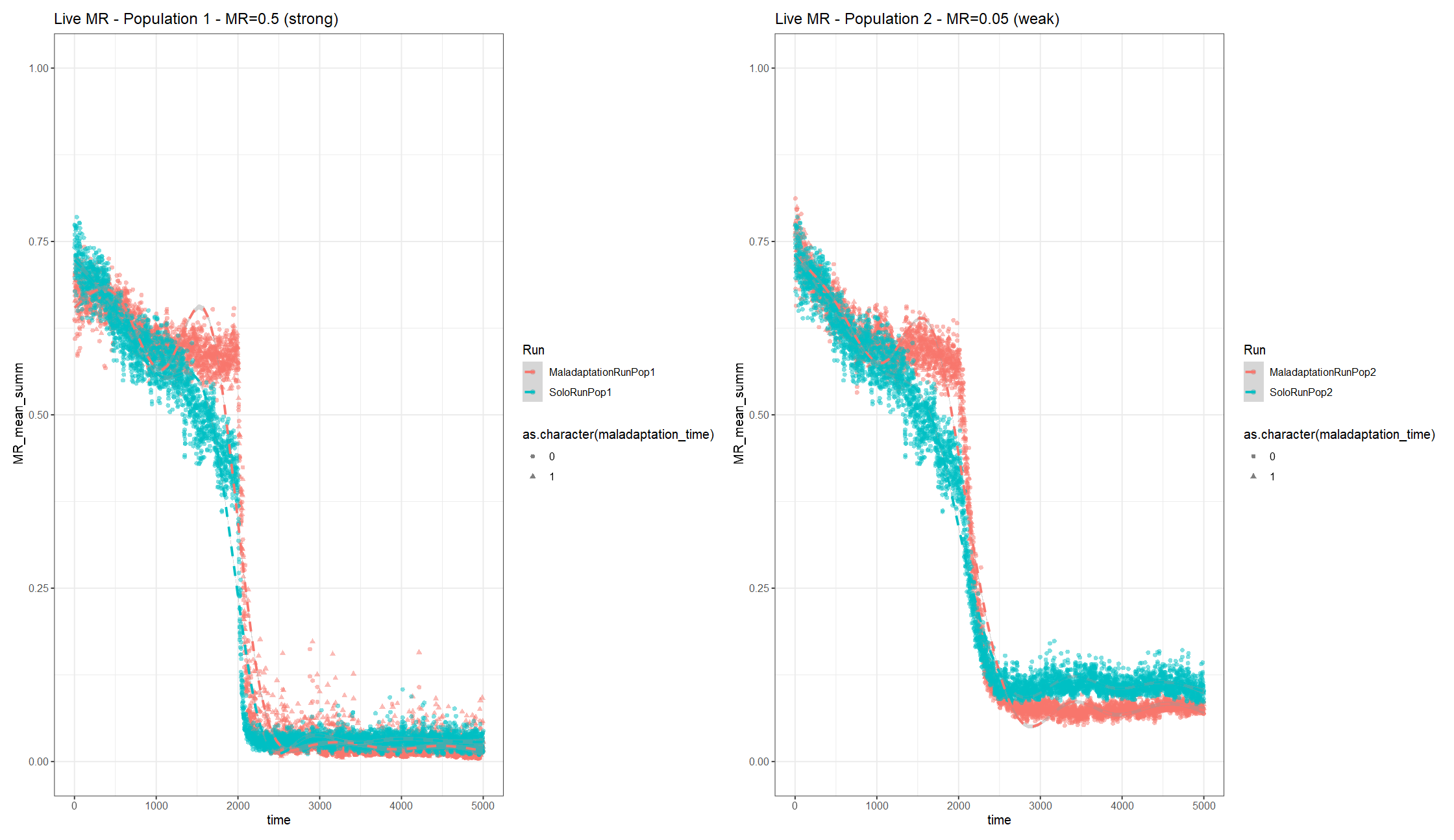
|  |  |  |
| --- | --- | --- |
| Updated MR inheritance + competition + MR scale (removed initial rescale, converted all to 0-1) – Recruitment 0.003 | | |
| age\_impact = 1.0  MR\_death\_impact = F  MR\_lateintro = F  recruitment\_const = 0.003  comp\_impact = 0.9 |  |  |
| age\_impact = 1.0  MR\_death\_impact = 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**

|  |  |  |
| --- | --- | --- |
| 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. |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

**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 |  |  |
| age\_impact = 1.0  MR\_death\_impact = 0.2  MR\_lateintro = T - 1000  recruitment\_const = 0.003  comp\_impact = 0.9 |  |  |
|  |  |
| T=2000 |  |  |
|  |  |
| 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 |  |  |
| age\_impact = 1.0  MR\_death\_impact = 0.75  MR\_lateintro = T - 1000  recruitment\_const = 0.003  comp\_impact = 0.9 |  |  |
| age\_impact = 1.0  MR\_death\_impact = 0.8  MR\_lateintro = T - 2000  recruitment\_const = 0.003  comp\_impact = 0.9 |  |  |
| age\_impact = 1.0  MR\_death\_impact = 1.0  MR\_lateintro = T - 1000  recruitment\_const = 0.003  comp\_impact = 0.9 |  |  |
|  |  |
| 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.

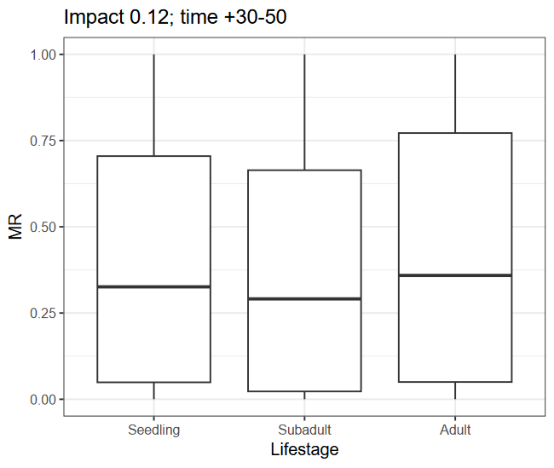
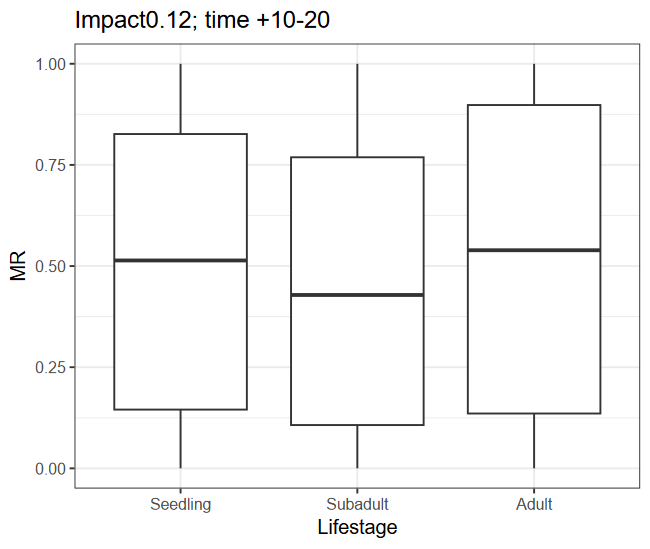
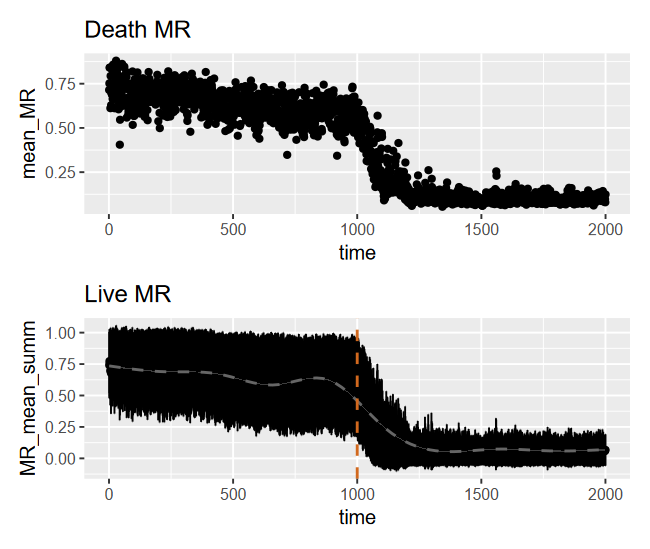
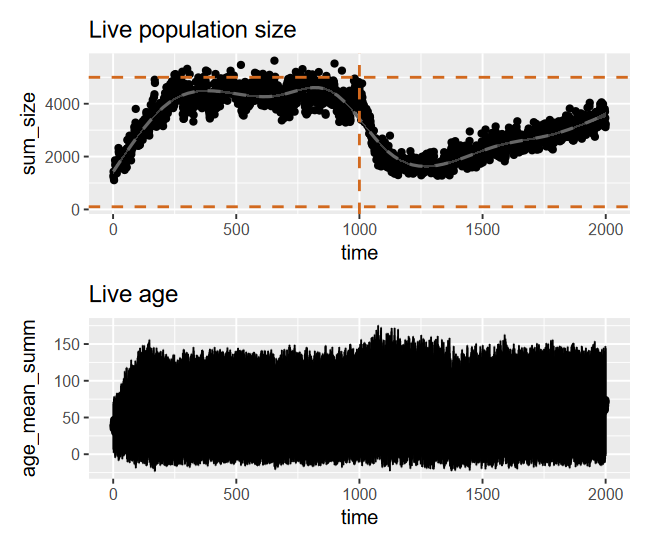
# Intervention

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

****

## 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

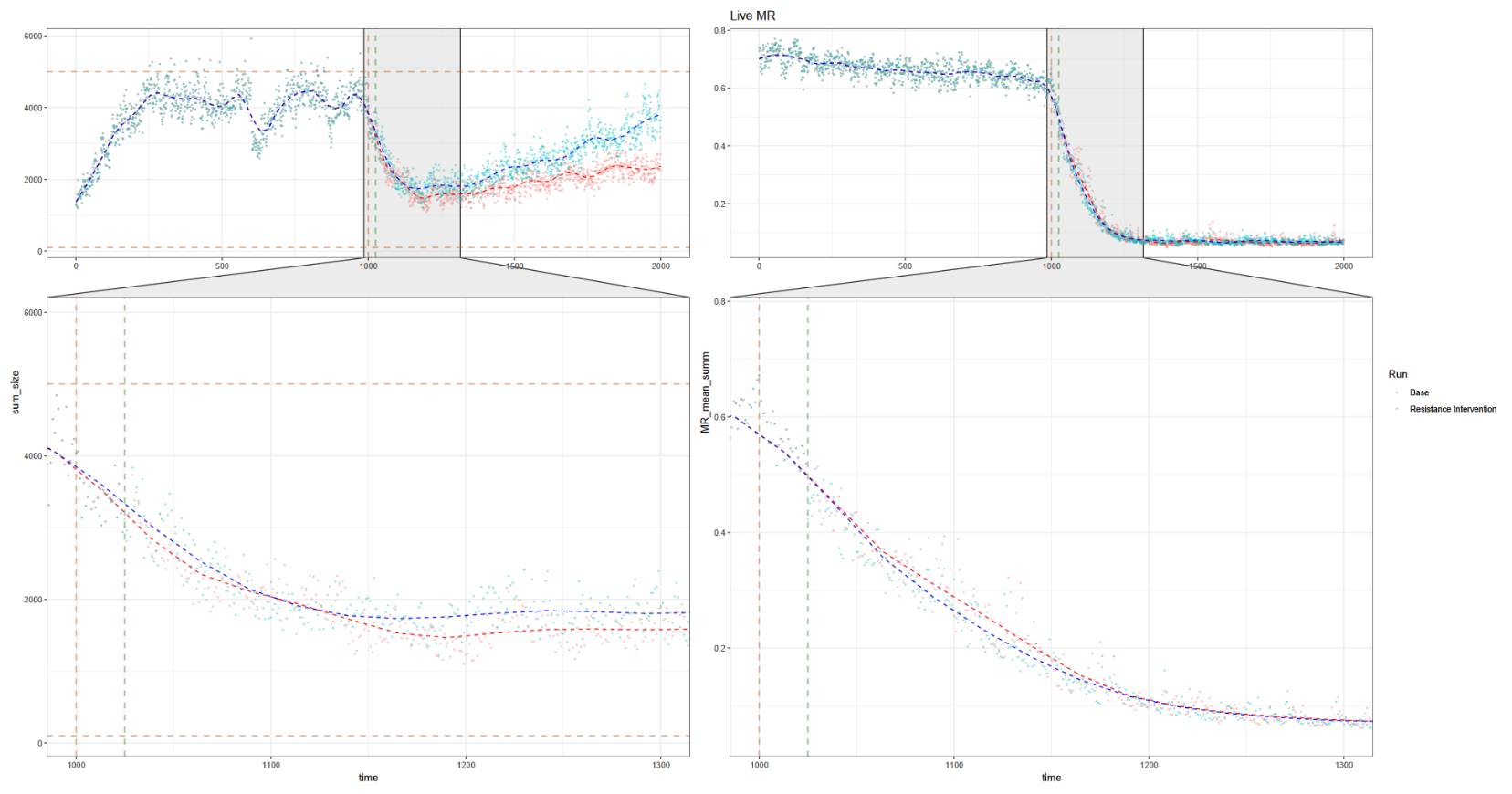
# A tibble: 2 × 2

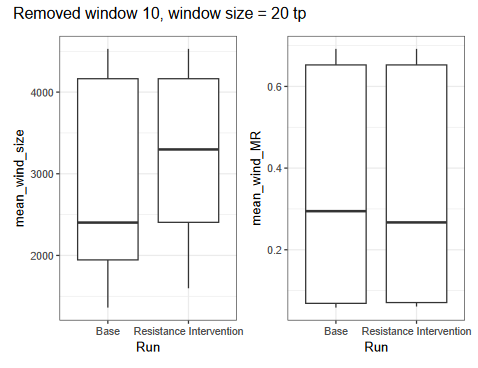
Run min\_pop\_size

*<chr>* *<dbl>*

1 Base 1362.

2 Resistance Intervention 1598.





## 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

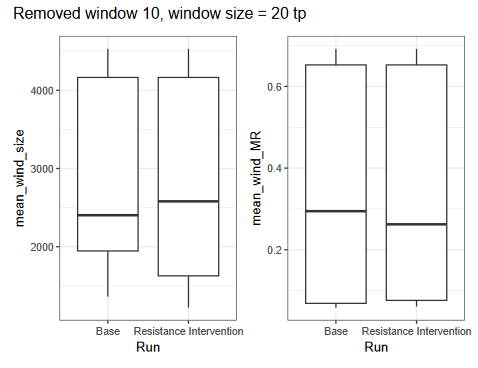
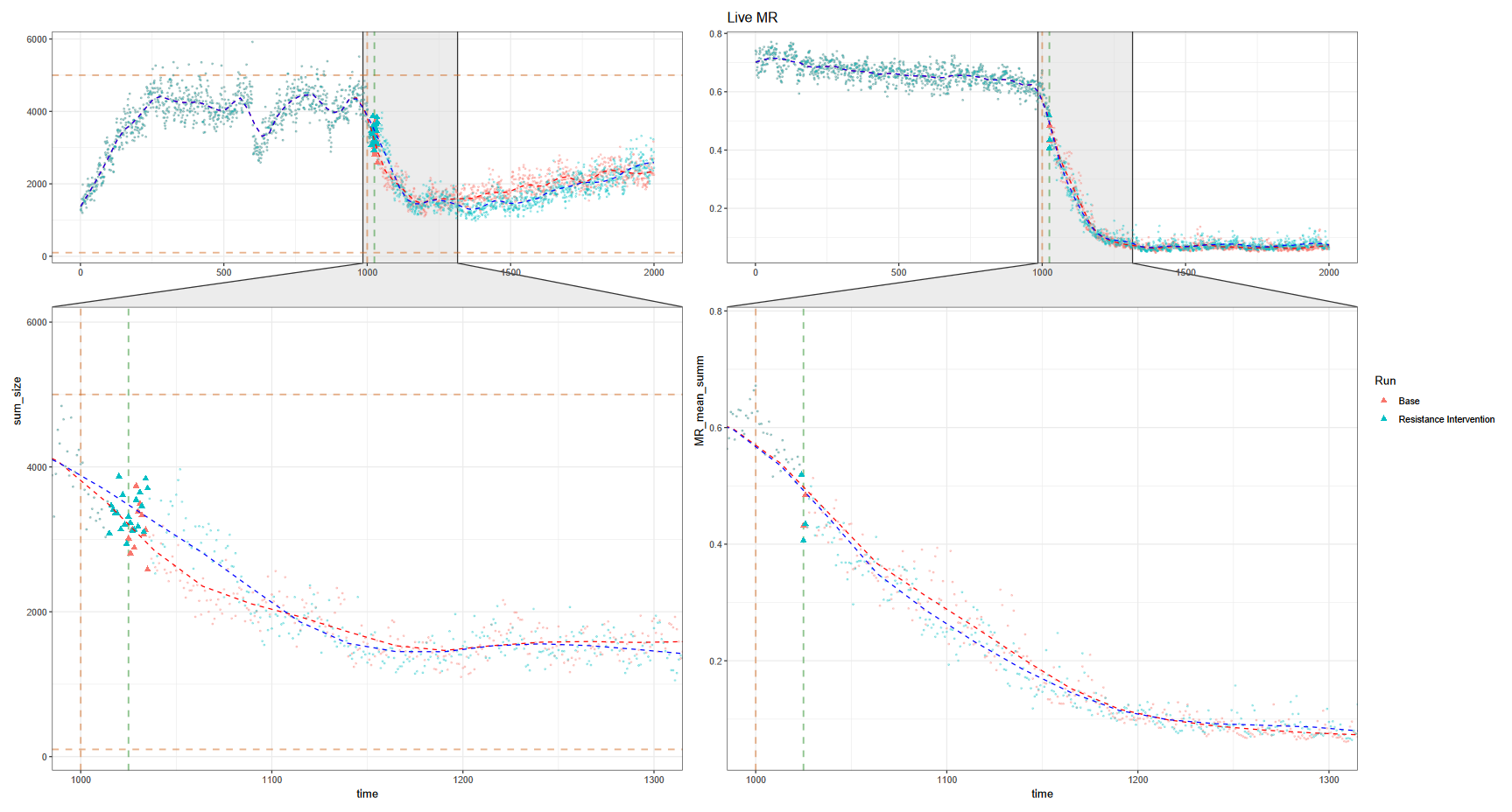
# A tibble: 2 × 2

Run min\_pop\_size

*<chr>* *<dbl>*

1 Base 1362.

2 Resistance Intervention 1222.



## 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

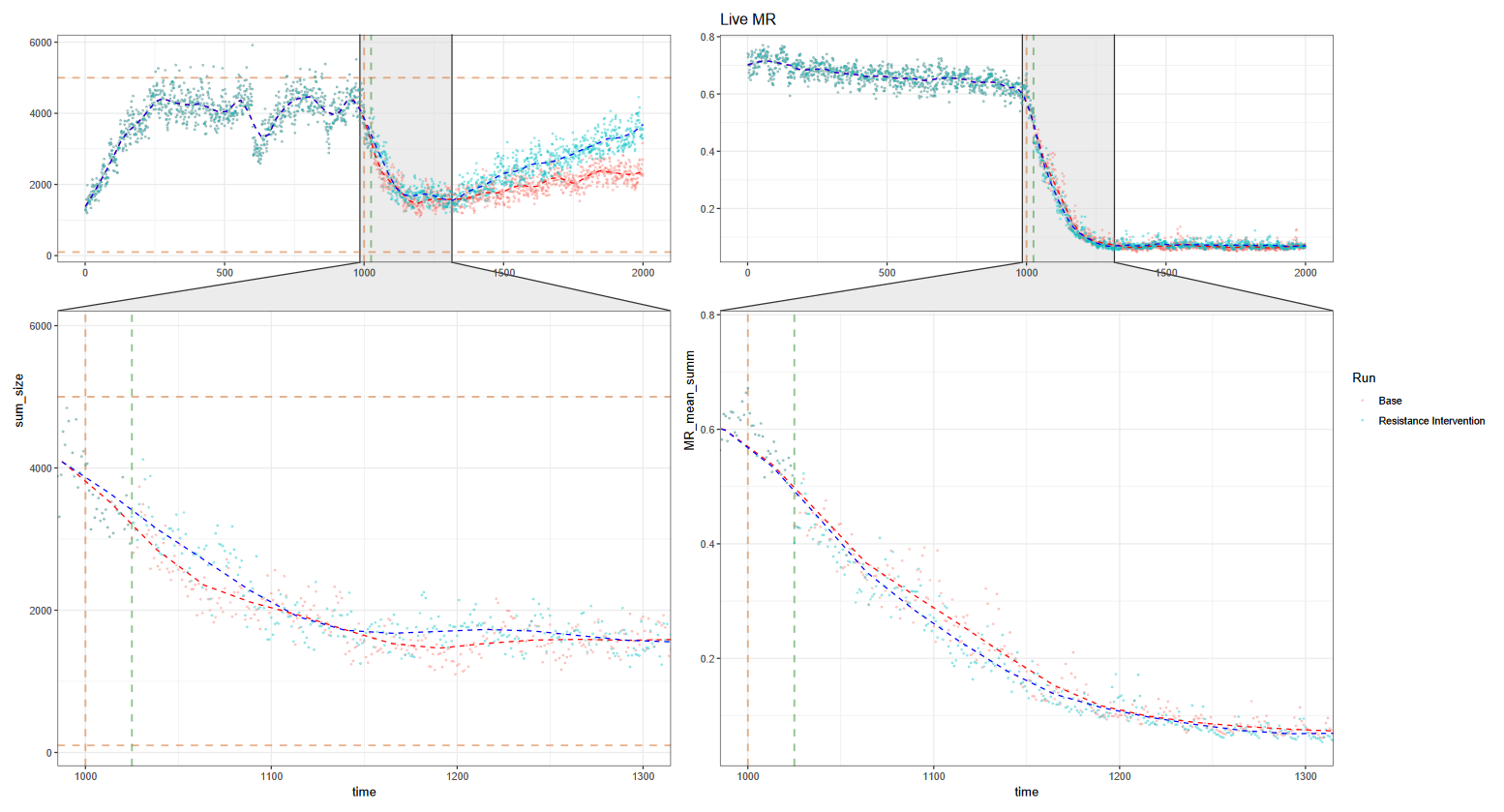
# A tibble: 2 × 2

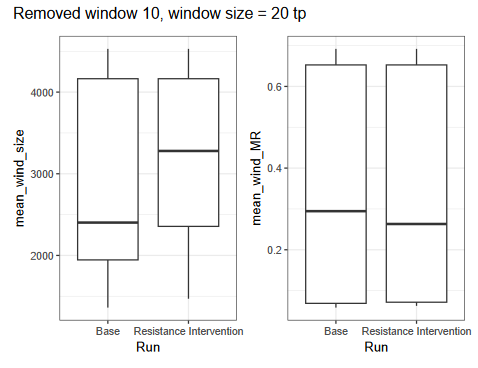
Run min\_pop\_size

*<chr>* *<dbl>*

1 Base 1362.

2 Resistance Intervention 1470.





## 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))

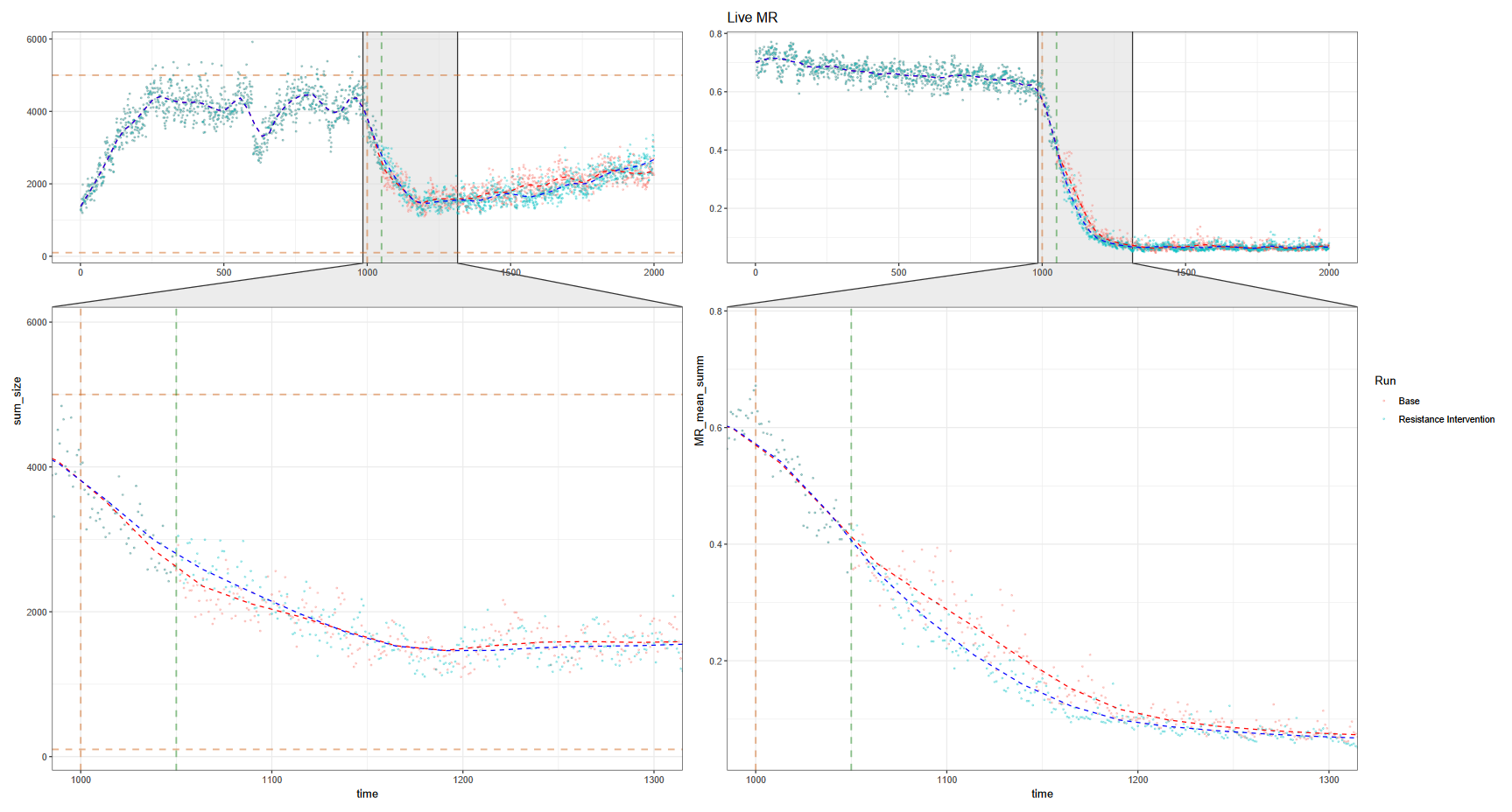
# A tibble: 2 × 2

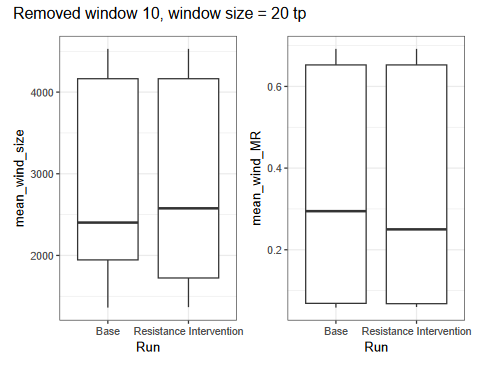
Run min\_pop\_size

*<chr>* *<dbl>*

1 Base 1362.

2 Resistance Intervention 1367.





## 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

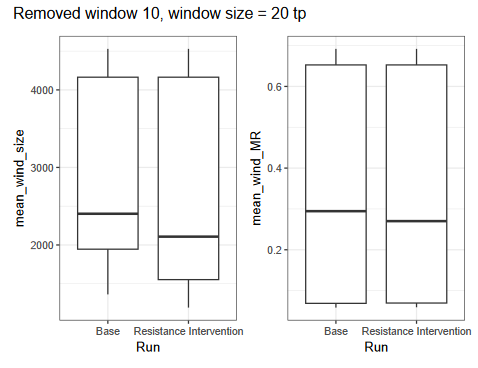
Run min\_pop\_size

*<chr>* *<dbl>*

1 Base 1362.

2 Resistance Intervention 1192.





## 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

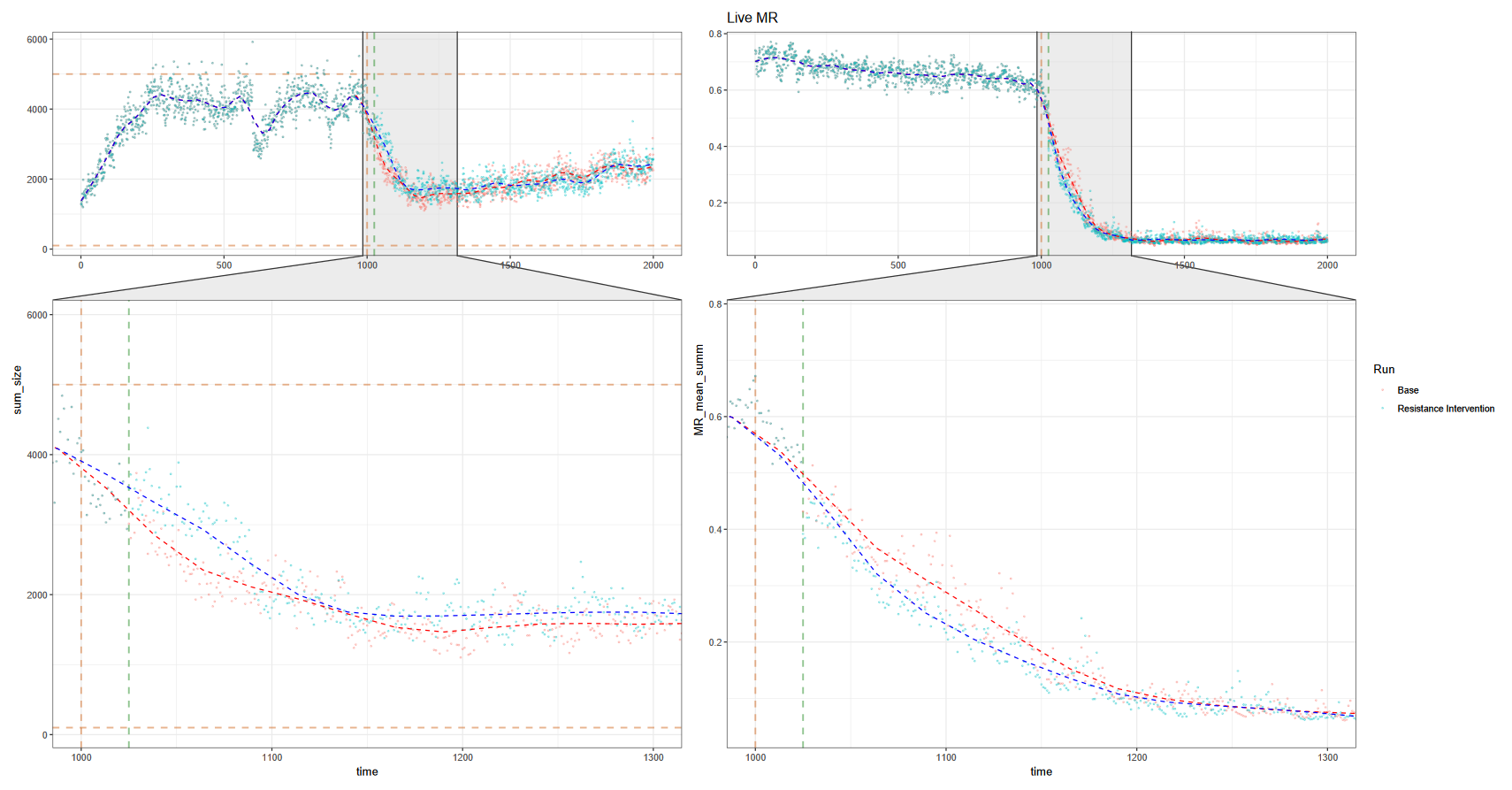
# A tibble: 2 × 2

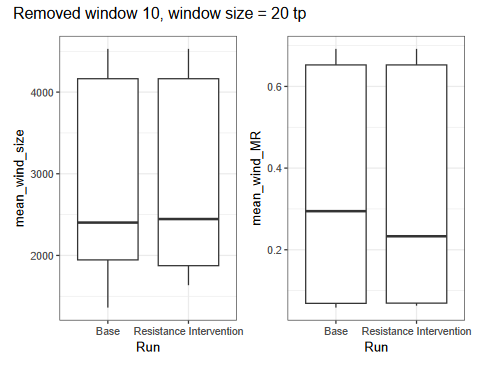
Run min\_pop\_size

*<chr>* *<dbl>*

1 Base 1362.

2 Resistance Intervention 1635.





## 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

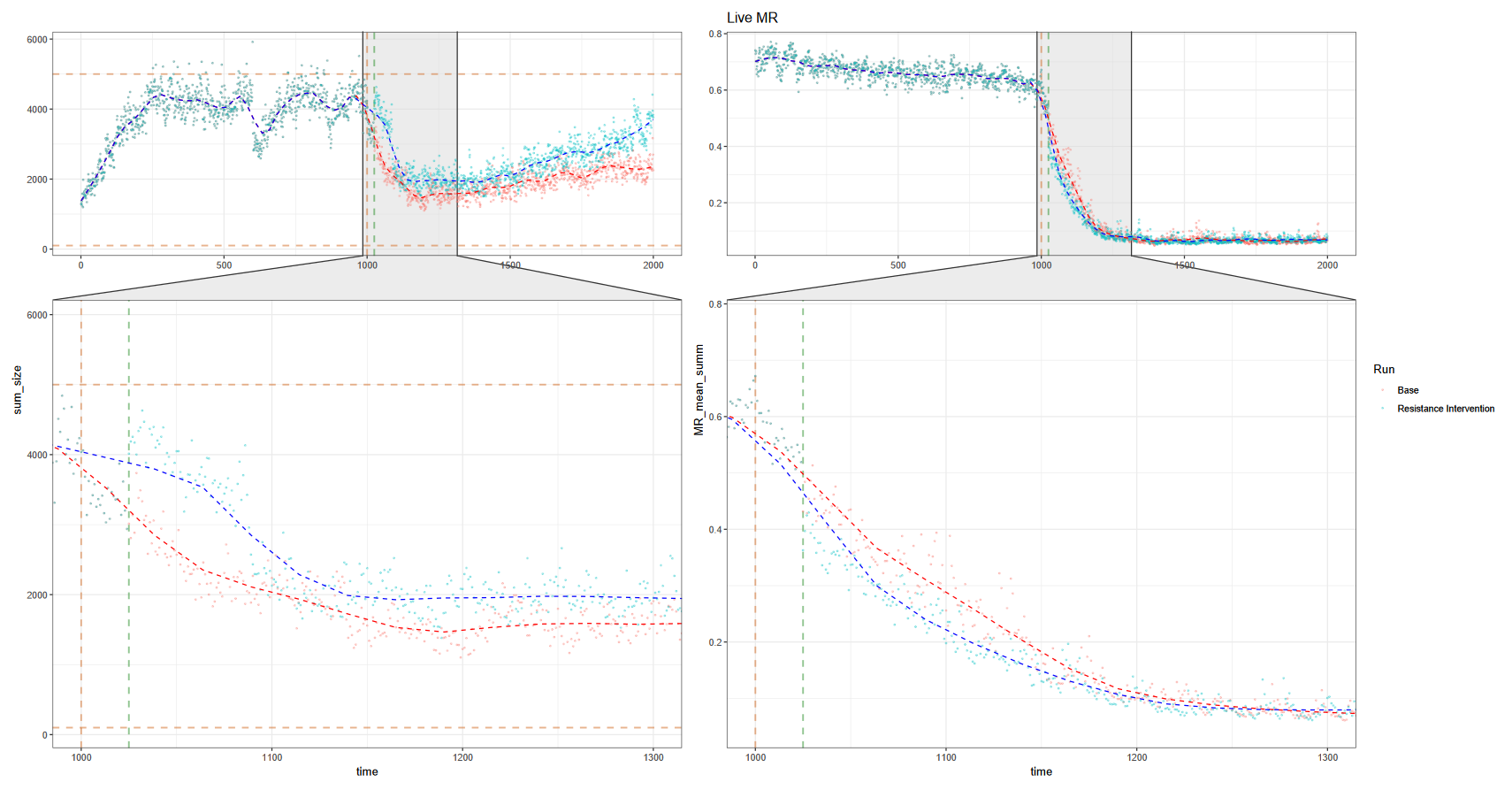
# A tibble: 2 × 2

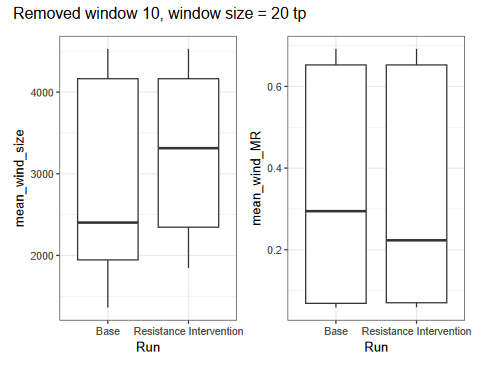
Run min\_pop\_size

*<chr>* *<dbl>*

1 Base 1362.

2 Resistance Intervention 1845.





## 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

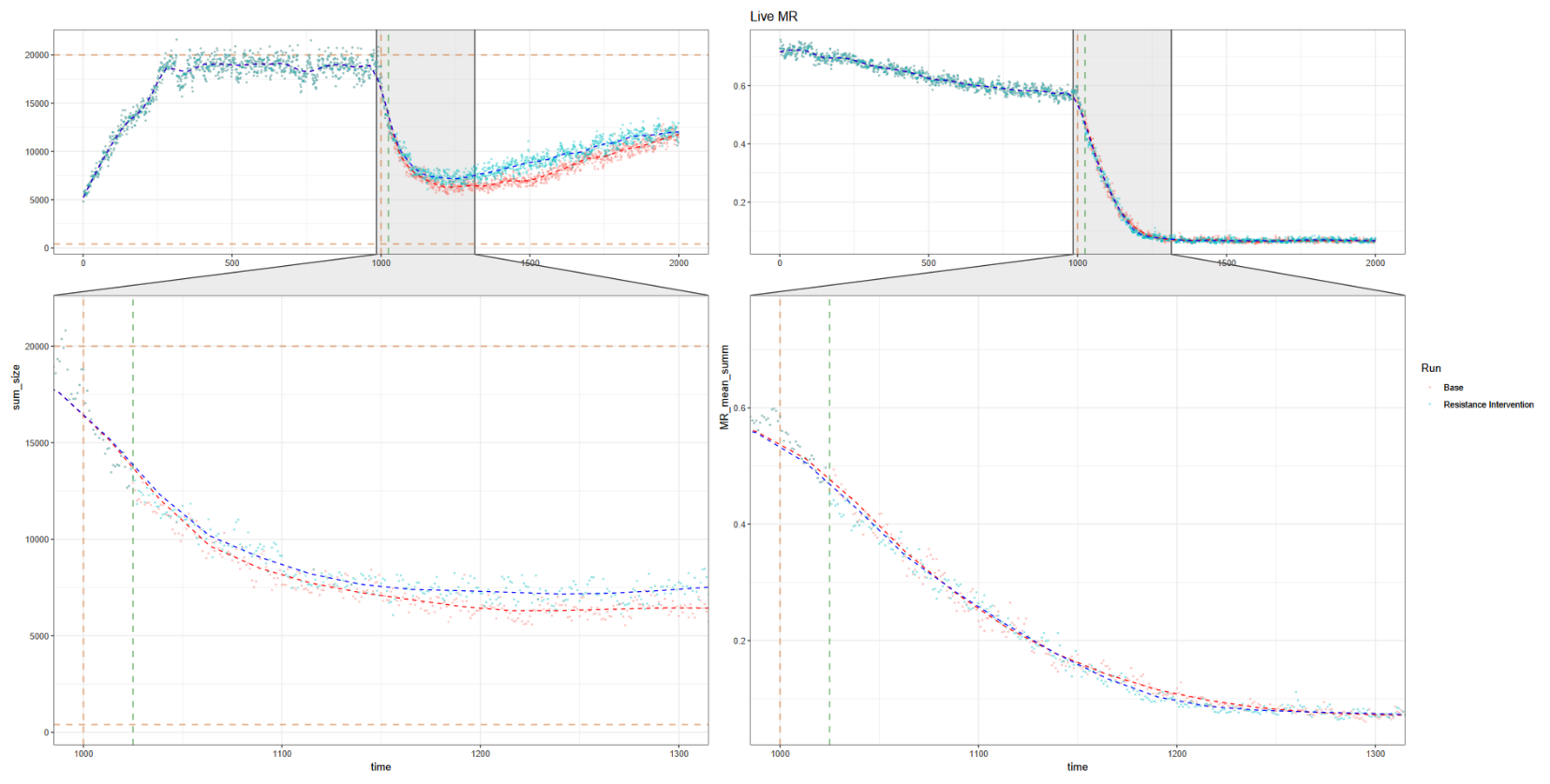
# A tibble: 2 × 2

Run min\_pop\_size

*<chr>* *<dbl>*

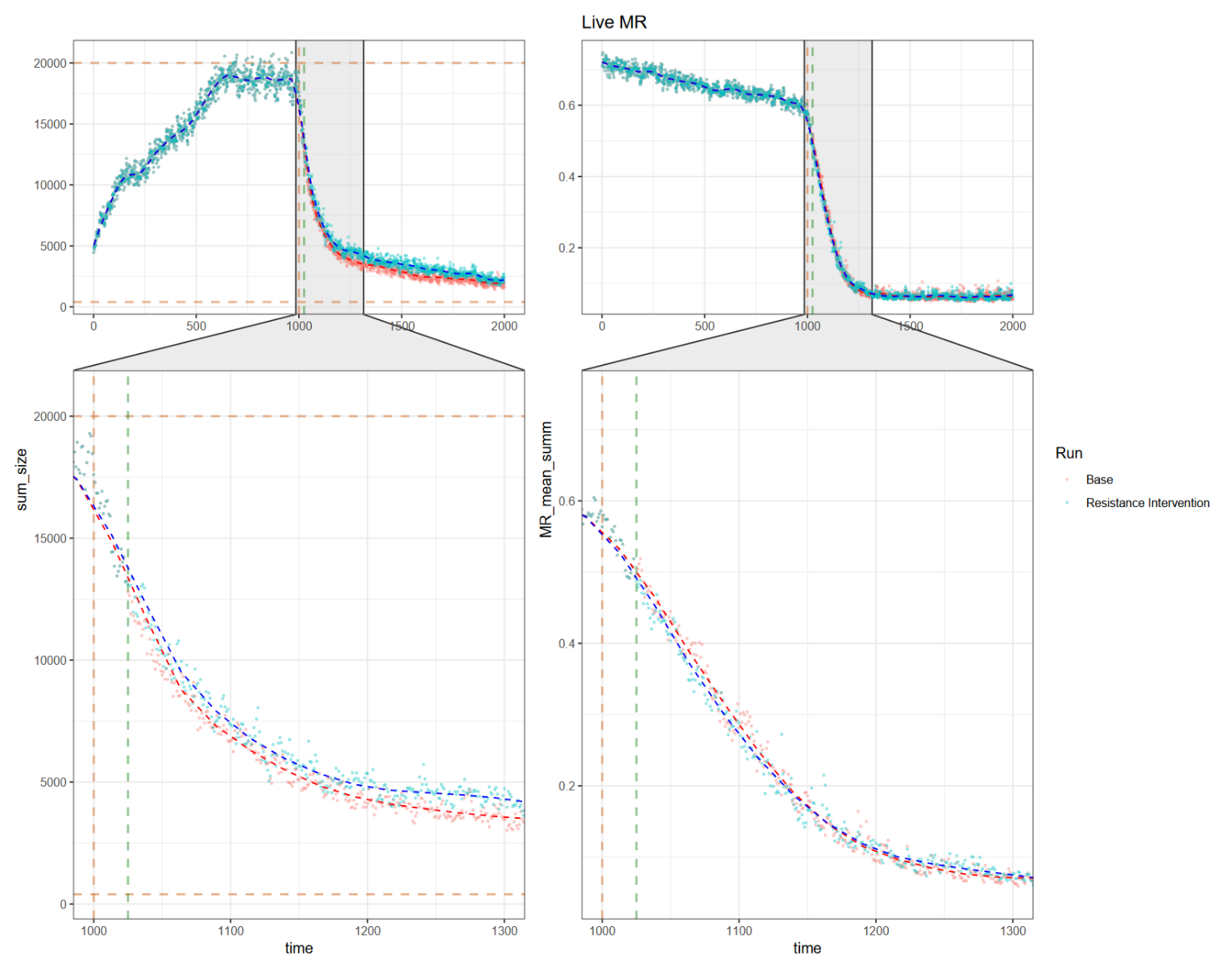
1 Base 6280.

2 Resistance Intervention 7039.





**Reducing recruitment: to 0.0025 from 0.003**



## 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

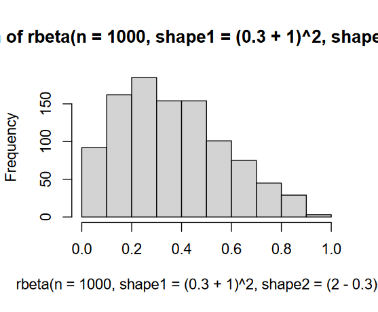
Run min\_pop\_size

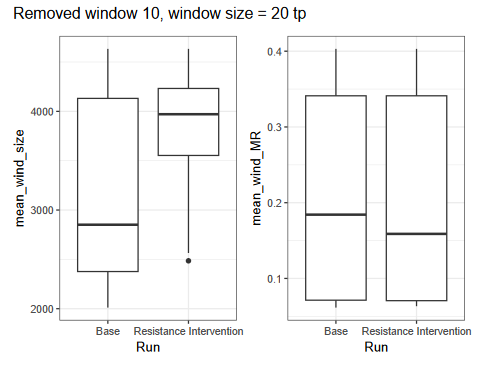
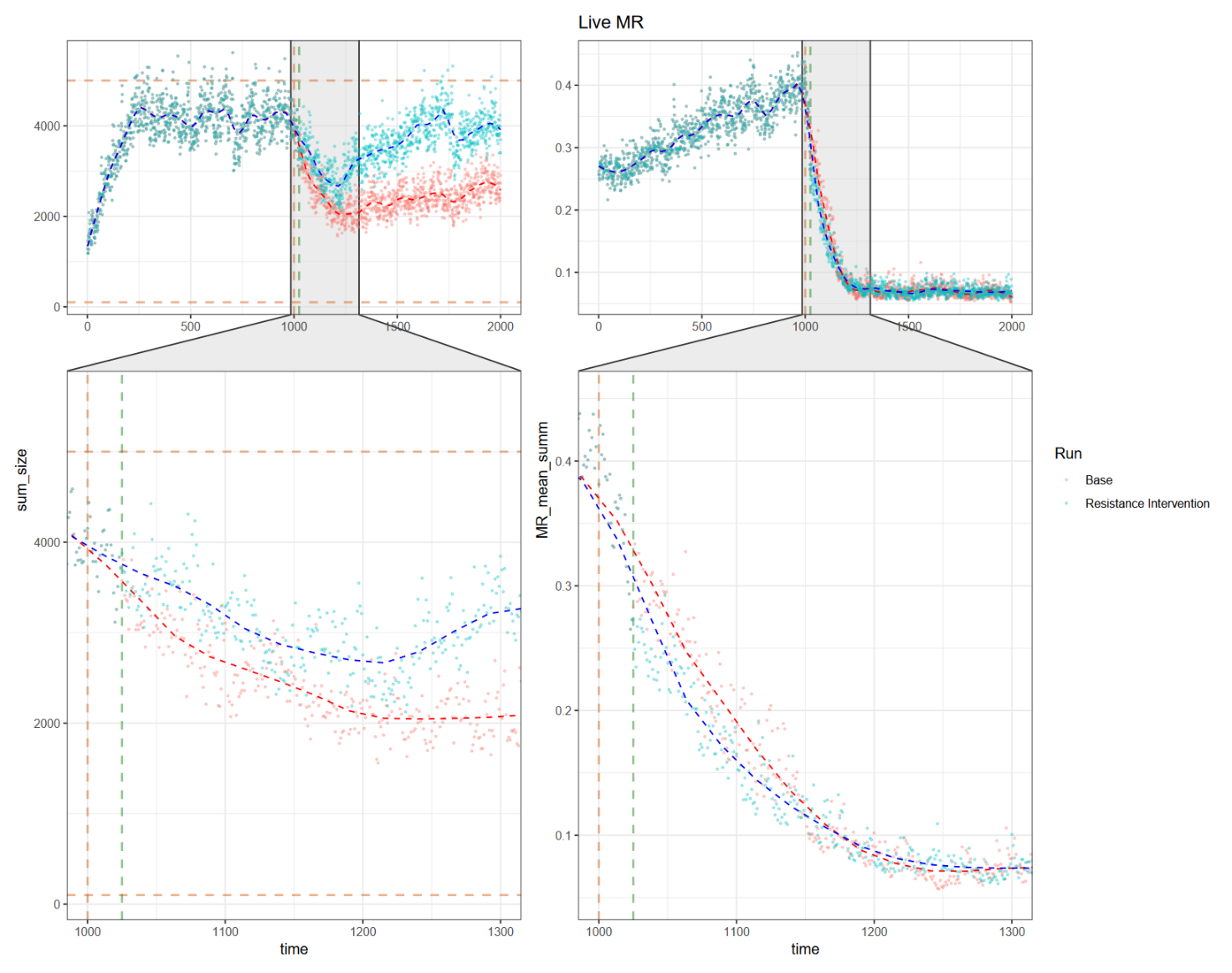
*<chr>* *<dbl>*

1 Base 2011.

2 Resistance Intervention 2485.

E.g., 0.3 recruit



****

## 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

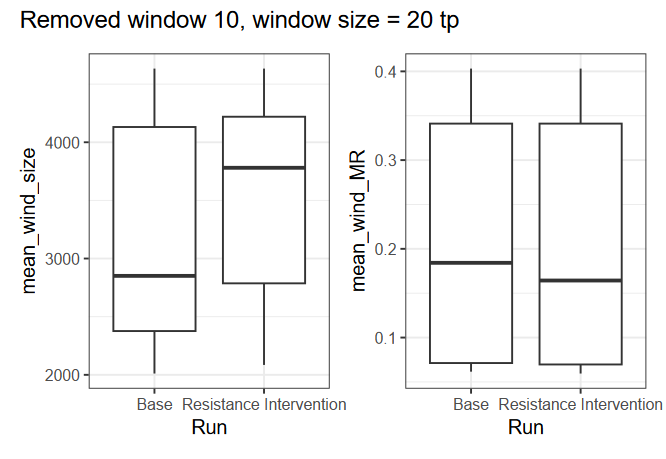
*<chr>* *<dbl>*

1 Base 1362.

2 Resistance Intervention 1845.

A screenshot of a graph

AI-generated content may be incorrect.



## 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.

