

Mesocosm experiment plots

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This document can be found at <https://github.com/darwinanddavis/SchistoMesocosm>

TO DO

- How much of the population does the sampling effort capture?

Overview

This document uses the schisto mesocosm 2016 data to explore cercariae production from snail hosts of different body sizes (diameter in mm and mass in mg) over a 14 week period under high and low N/P nutrient conditions. Host reproduction (egg masses) is also calculated.

Install dependencies

Get data

```
wd <- params$dir # working dir is set in yaml header
setwd(paste0(wd, "/"))
f <- "meso1_.csv"
f2 <- "meso2_.csv"
```

Load data

```
'data.frame': 720 obs. of 13 variables:
 $ Tank      : int  1 2 3 4 5 6 7 8 9 10 ...
 $ NP        : chr  "High" "Low" "Low" "High" ...
 $ Size      : chr  "Small" "Intermediate" "Intermediate" "Small" ...
 $ Schisto   : chr  "No" "Yes" "Yes" "Yes" ...
 $ Week      : int  0 0 0 0 0 0 0 0 0 0 ...
 $ Snail      : int  60 60 60 60 60 60 60 60 60 60 ...
 $ Total_Biomass : num  96 620.6 670.5 86.7 121.4 ...
 $ Cercarial_production: int  0 0 0 0 0 0 0 0 0 0 ...
 $ Infected_abundance : int  0 0 0 0 0 0 0 0 0 0 ...
 $ Sampling_Effort : int  NA NA NA NA NA NA NA NA NA NA ...
 $ Eggs      : int  NA NA NA NA NA NA NA NA NA NA ...
 $ Phyto_F   : num  NA NA NA NA NA NA NA NA NA NA ...
 $ Peri_F    : num  NA NA NA NA NA NA NA NA NA NA ...
```

Set plotting graphics

Set plotting parameters

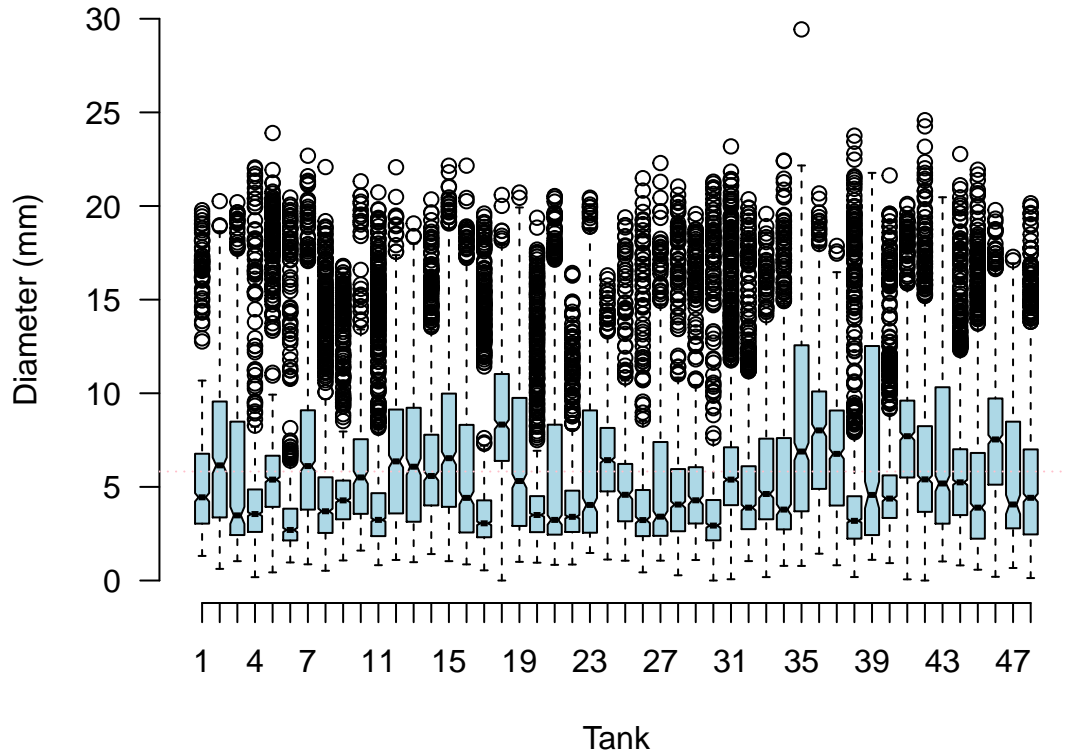
Get only infected snails

Mesocosm 1 data sheet

Snail size per tank

Shell diameter (mm) per tank

Shell diameter (mm) over 14 weeks

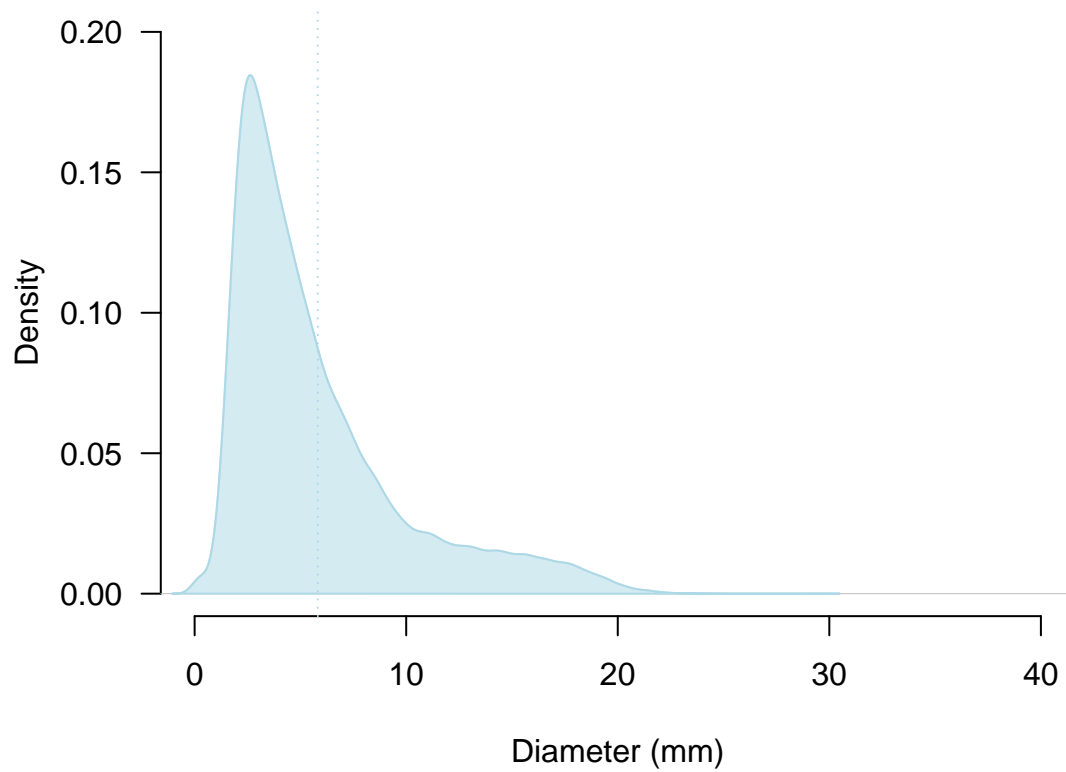


Welch Two Sample t-test

```
data: Diameter and Tank
t = -292.67, df = 54609, p-value < 2.2e-16
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -19.45879 -19.19989
sample estimates:
mean of x mean of y
 5.821956 25.151292
```

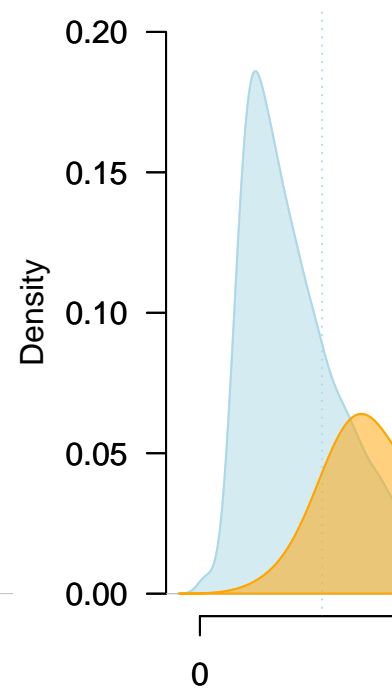
Snail diameter (mm) distribution

Overall shell diameter (mm) over 14 weeks



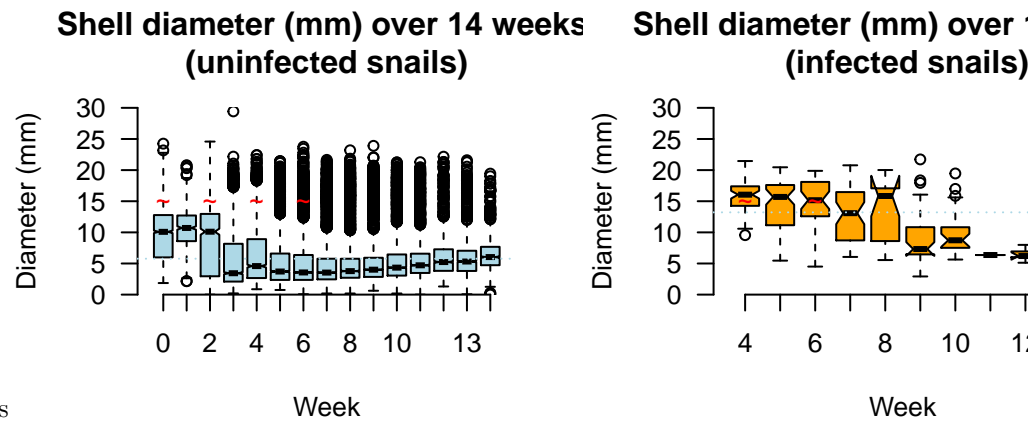
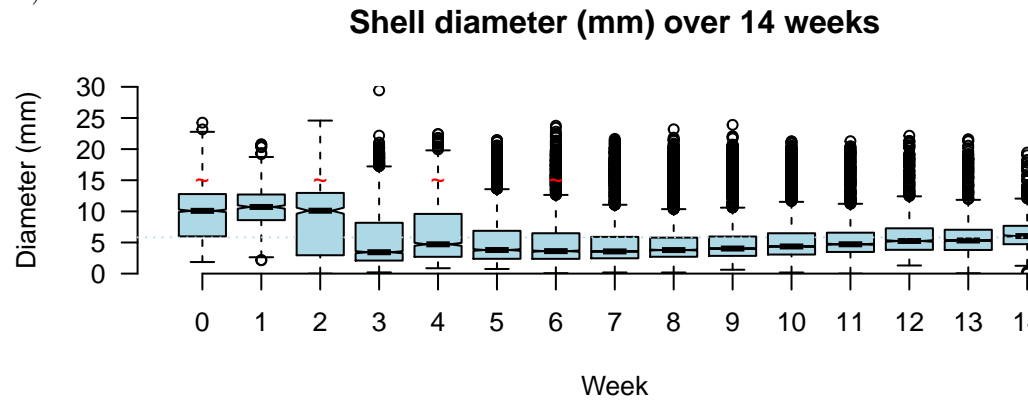
```
xchar= 0.9529 ; (yextra,ychar)= -0.004785 0.004785  
points2( 29.8 29.8 , 0.1 0.09522 , pch= 20 20 , ...)
```

Shel



Snail size over time (weeks)

Shell diameter (mm) over time (weeks)



~1000 eggs inoculated at 0,2,4,6 weeks

Snail size over time (weeks) per tank

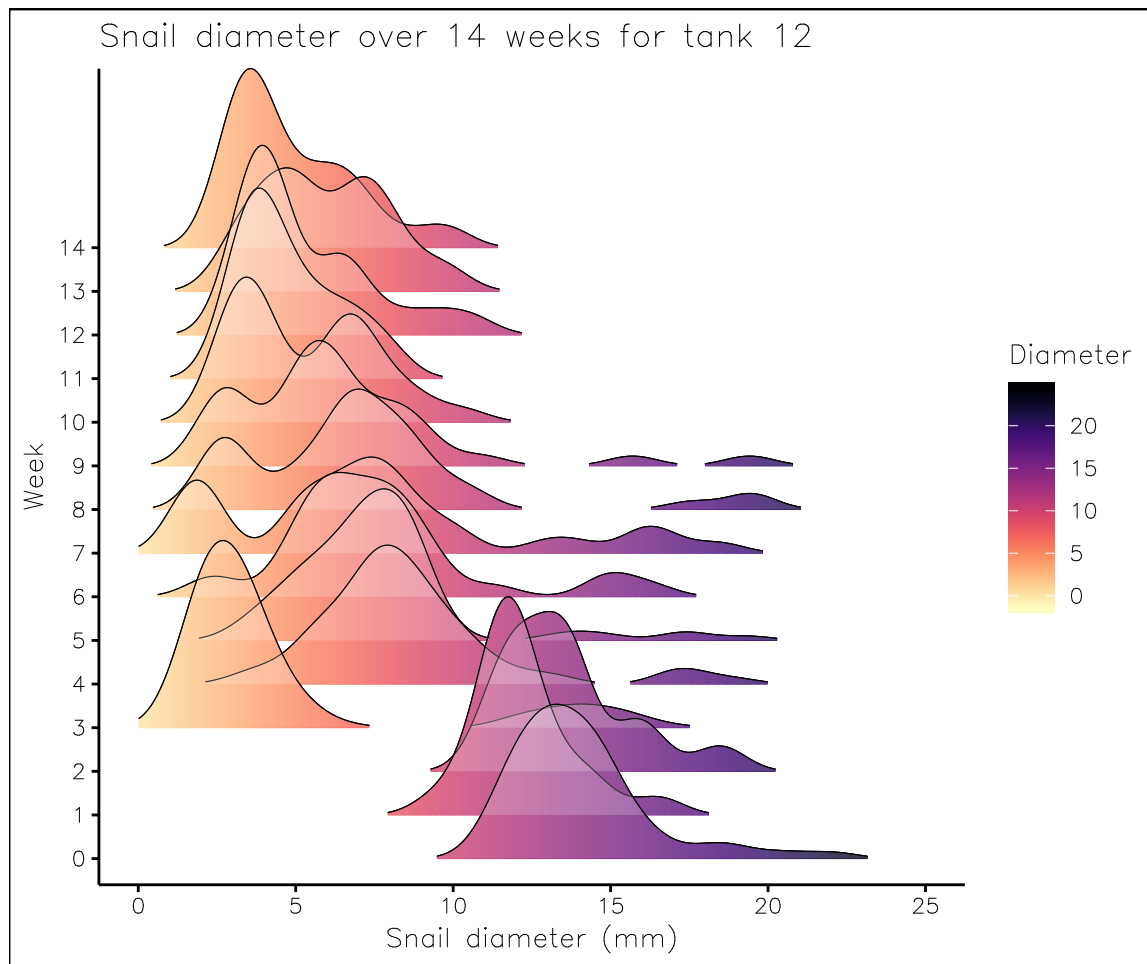
For all tanks (n = 48), see 'Size_per_tank_over_time.pdf' in /Users/malishev/Documents/Emory/research

~1000 eggs inoculated at 0,2,4,6 weeks

Select tank. Max max(meso1\$Tank)

```
tank <- 12 # Select tank #. Max 48  
paste0("Tank ", tank)
```

```
[1] "Tank 12"
```



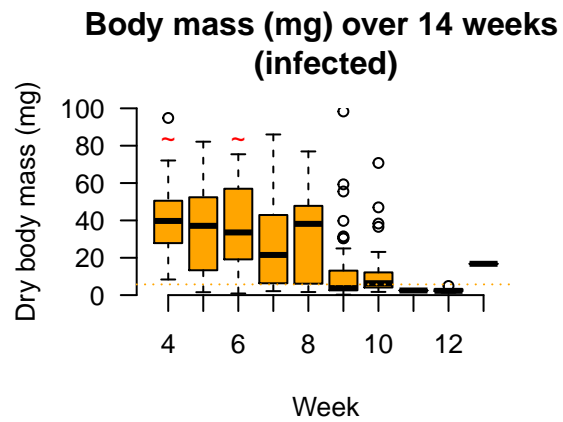
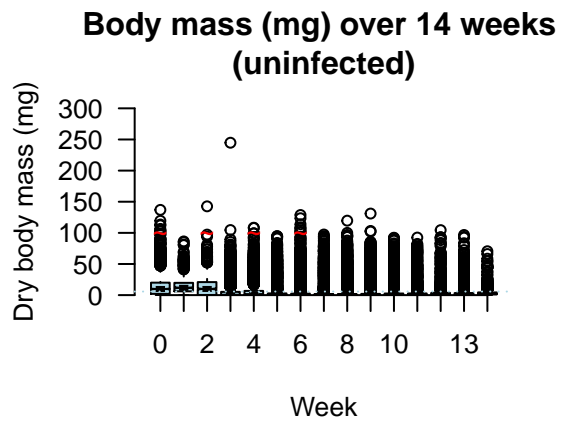
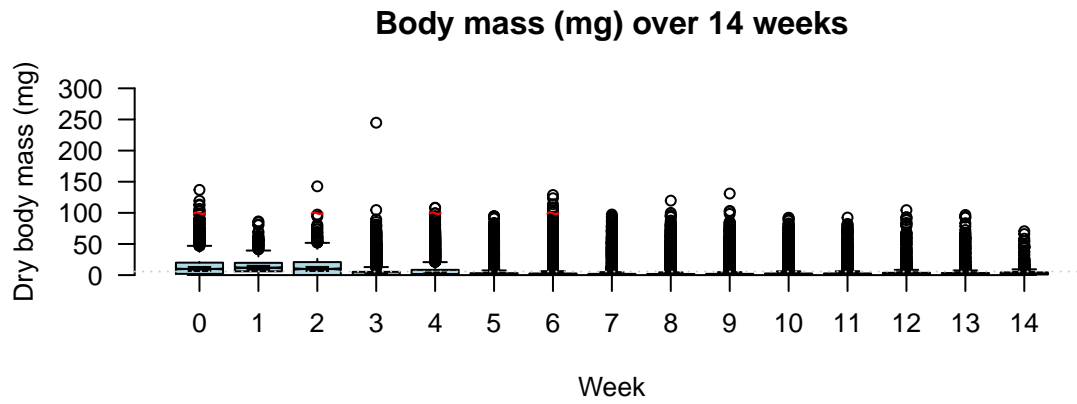
Snail size over time (weeks) per tank (High resources)

Snail size over time (weeks) per tank (Low resources)

Body mass (mg) over time (weeks)

(Soft tissue dry mass in mg = $0.0096 * \text{Diameter}[\text{in mm}]^3$)

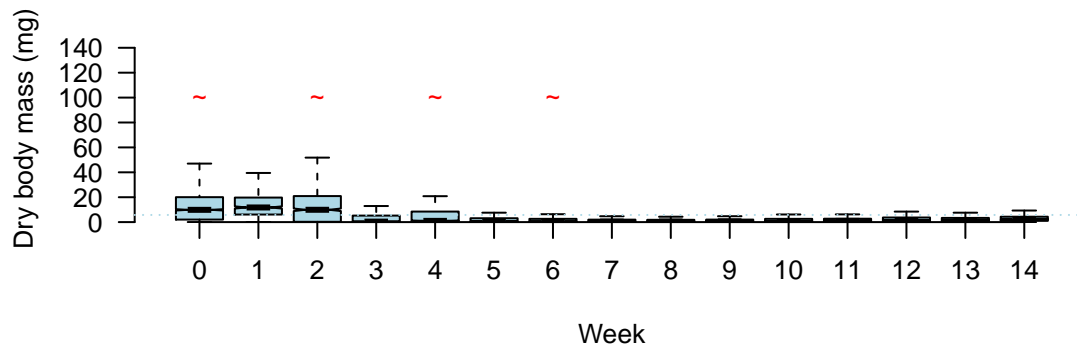
~1000 eggs inoculated at 0,2,4,6 weeks



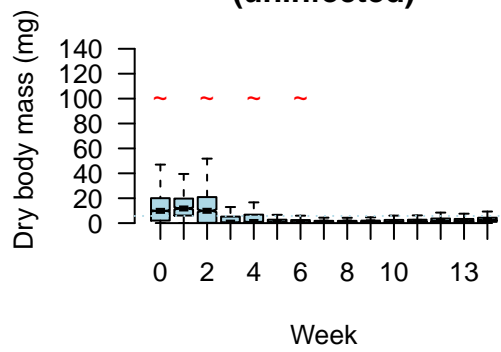
```
# A tibble: 1 x 2
  Biomass Cercariae
*   <dbl>     <int>
1   245.         0
```

Without max value of `as.numeric(outer)[1]`

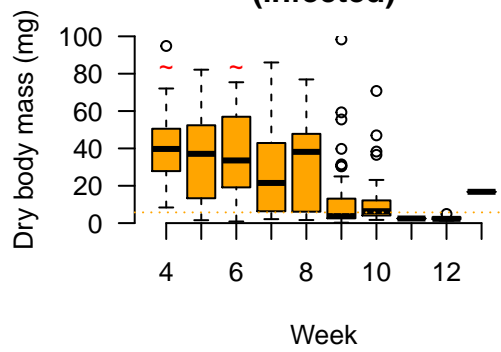
Body mass (mg) over 14 weeks without outlier



Body mass (mg) over 14 weeks (uninfected)

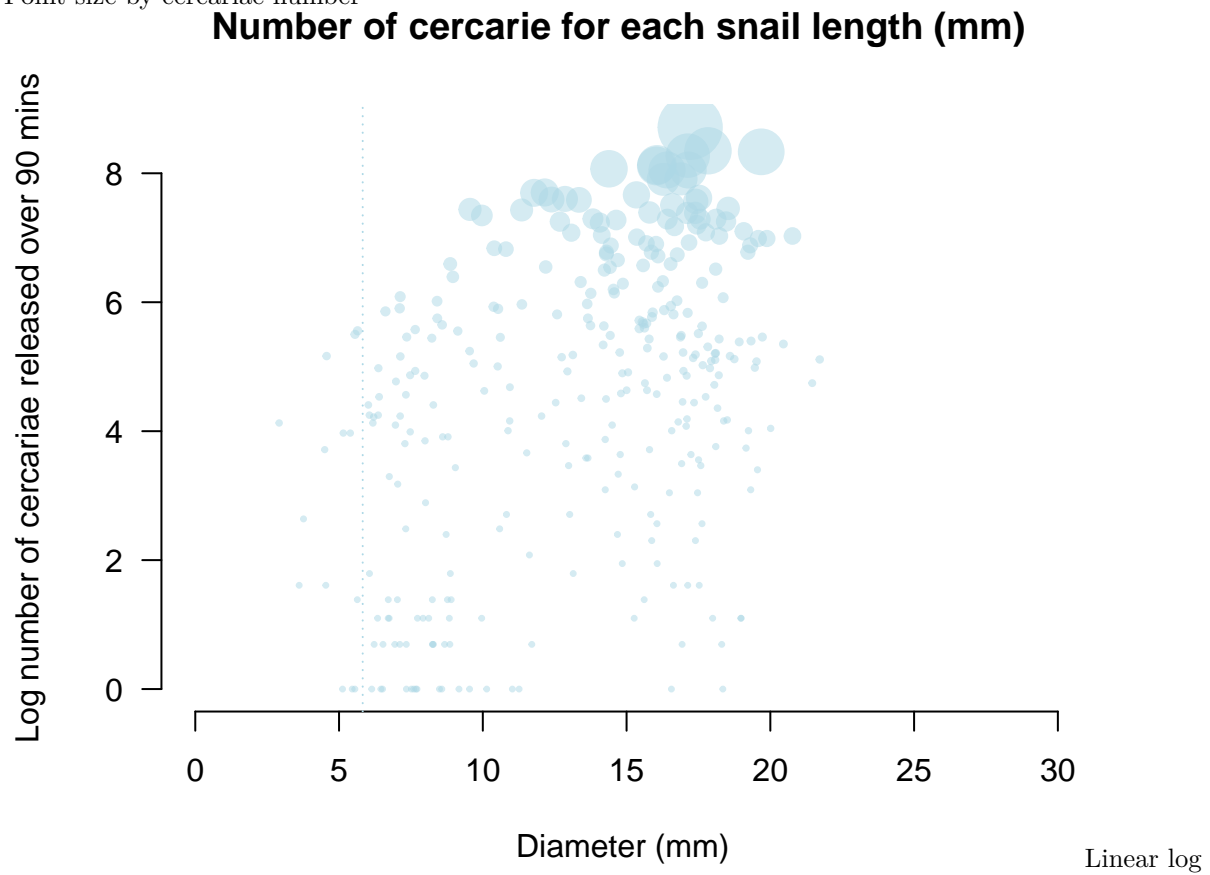


Body mass (mg) over 14 weeks (infected)



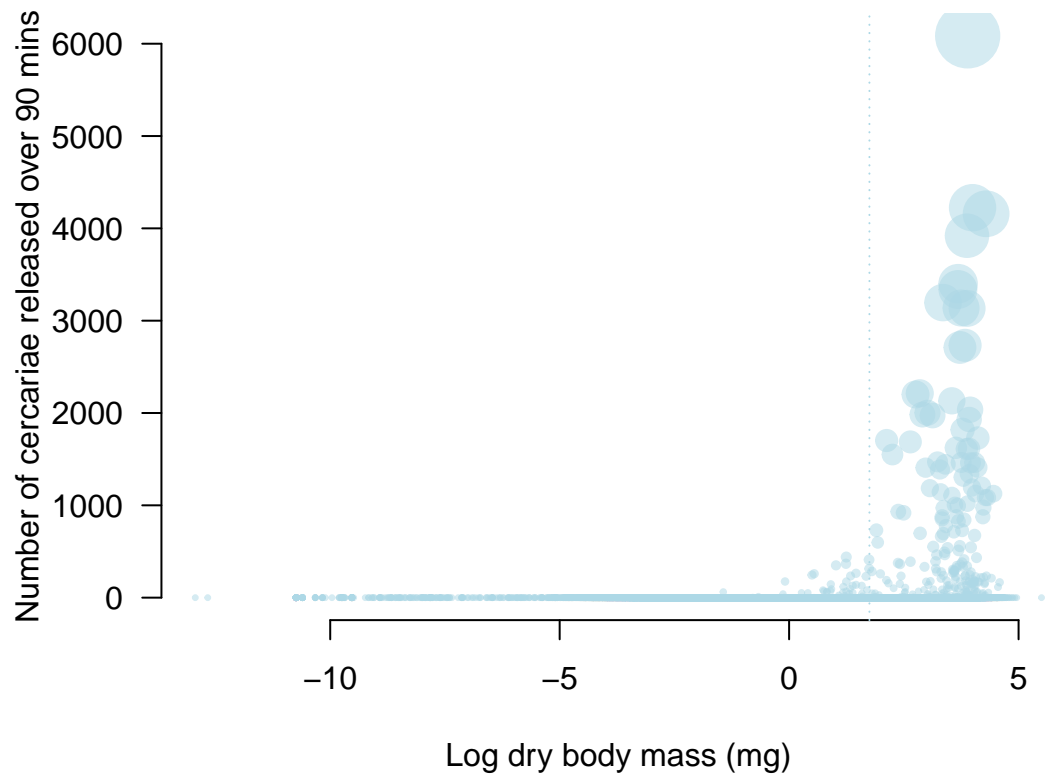
Snail size and number of cercariae produced

Point size by cercariae number



Snail mass and cercariae produced (mg)

Number of cercariae for each log snail mass (mg)



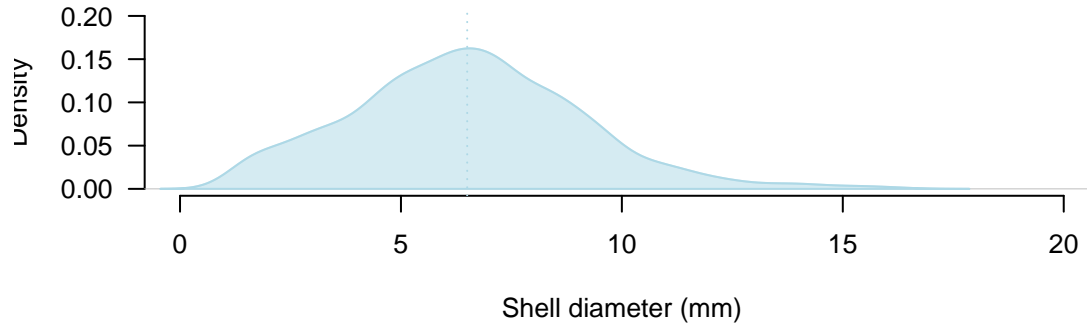
Snail size per tank

Shell diameter (mm)

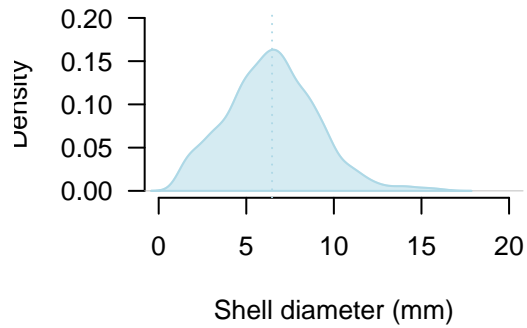
Select tank. Max `max(meso1$Tank)`

[1] "Tank 24"

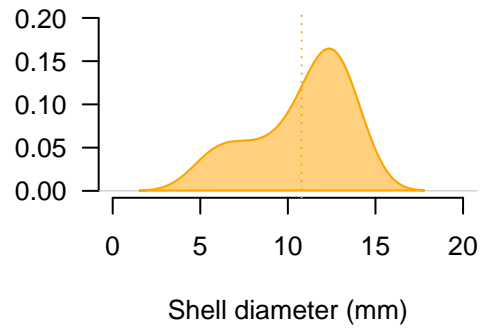
Shell diameter (mm) distribution for tank #24



Uninfected snails in tank #24



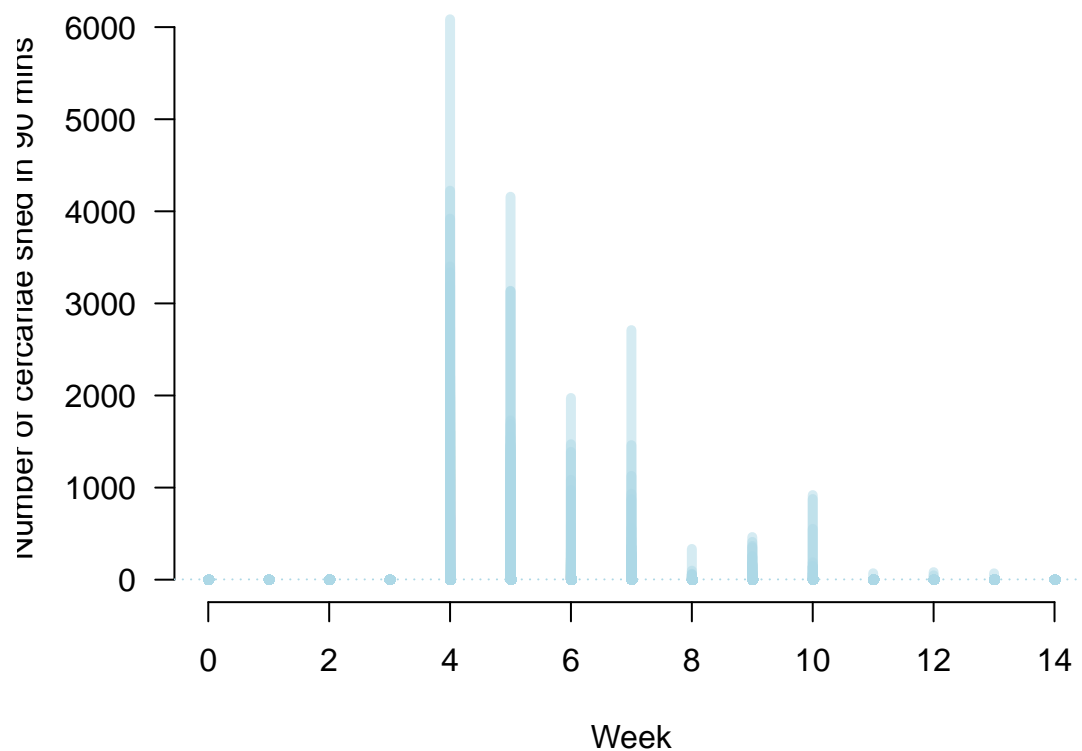
Infected snails in tank #24



Cercariae production over time

Cercariae shed over 90 mins per week
~1000 eggs inoculated at 0,2,4,6 weeks
Snail abundance over time (weeks)

Cercariae production over 14 weeks



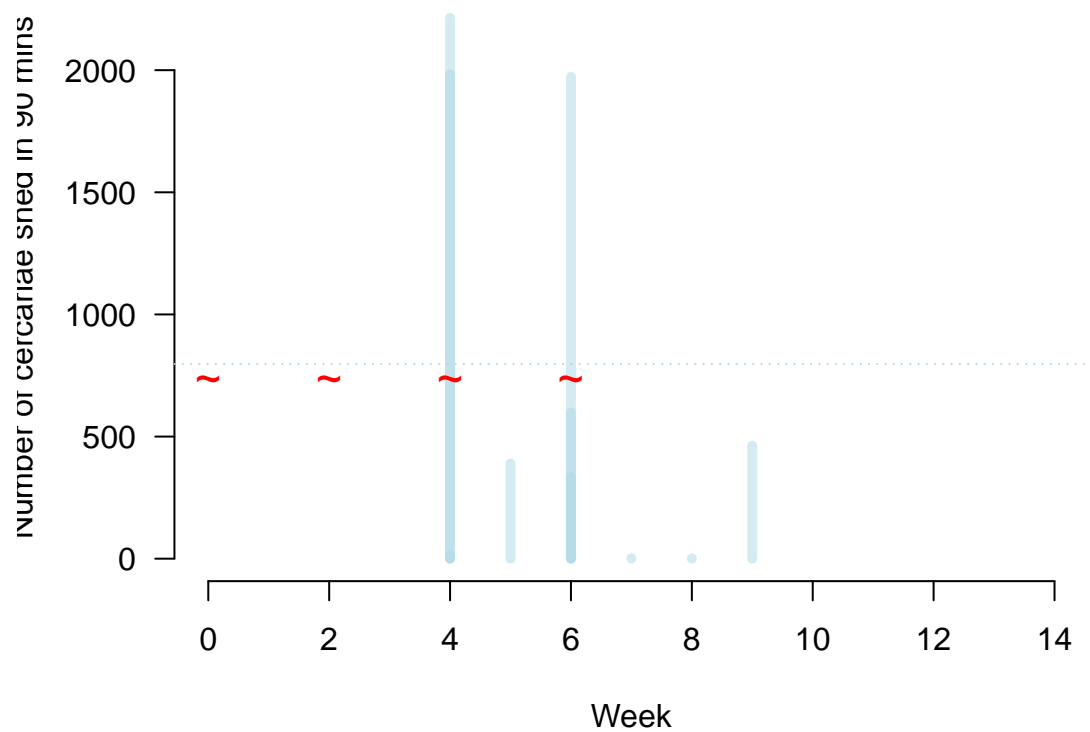
Tank cercariae production over time per tank

Select tank. Max `max(meso1$Tank)`

```
[1] "Tank 24"
```

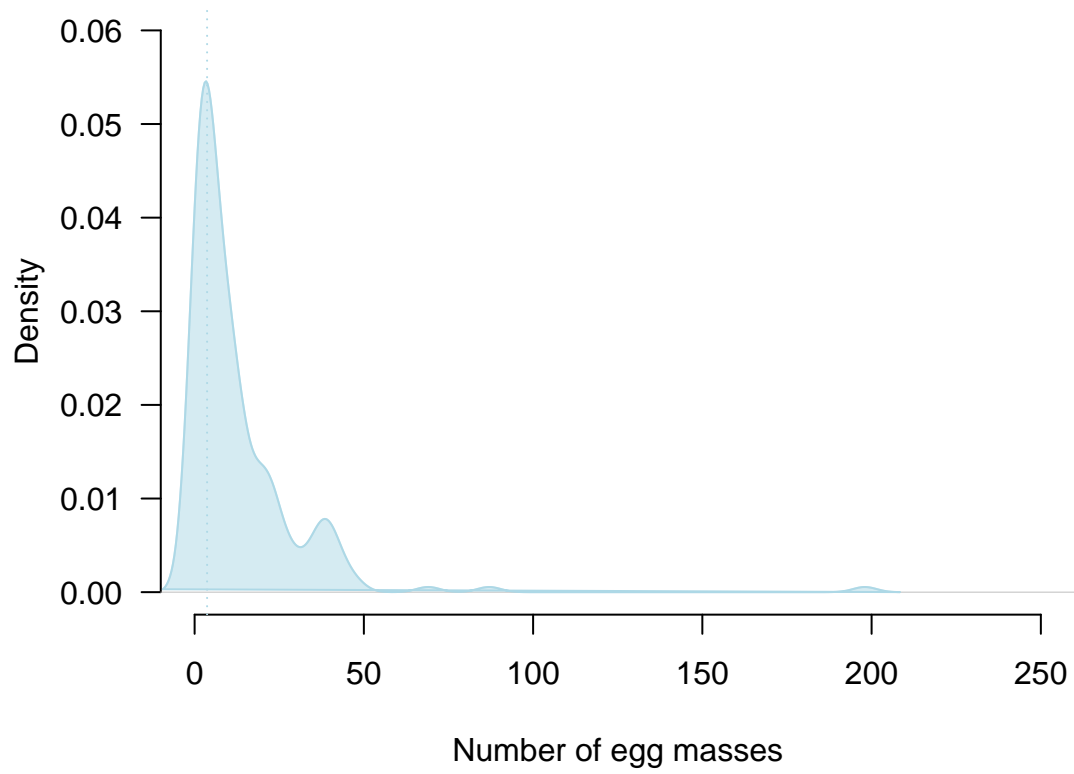
```
[1] 2300
```

Cercariae production for tank 24 over 14 weeks



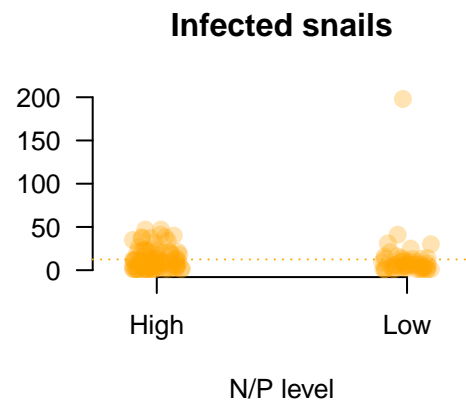
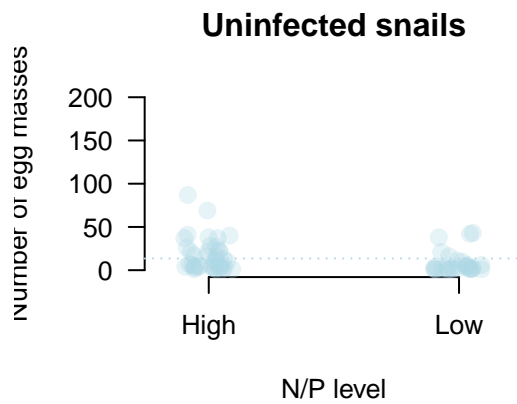
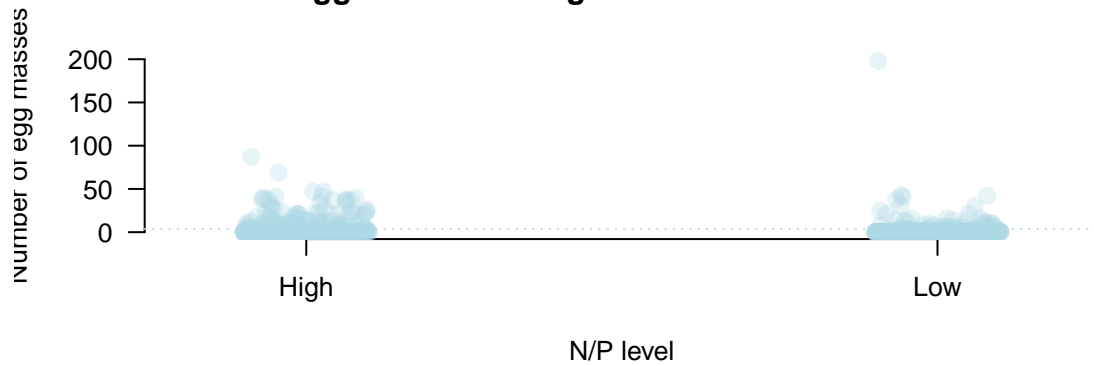
Egg mass distribution

Distribution of number of egg masses over 14 weeks



N/P concentration v egg mass

Number of egg masses for high and low N/P levels over 14 weeks

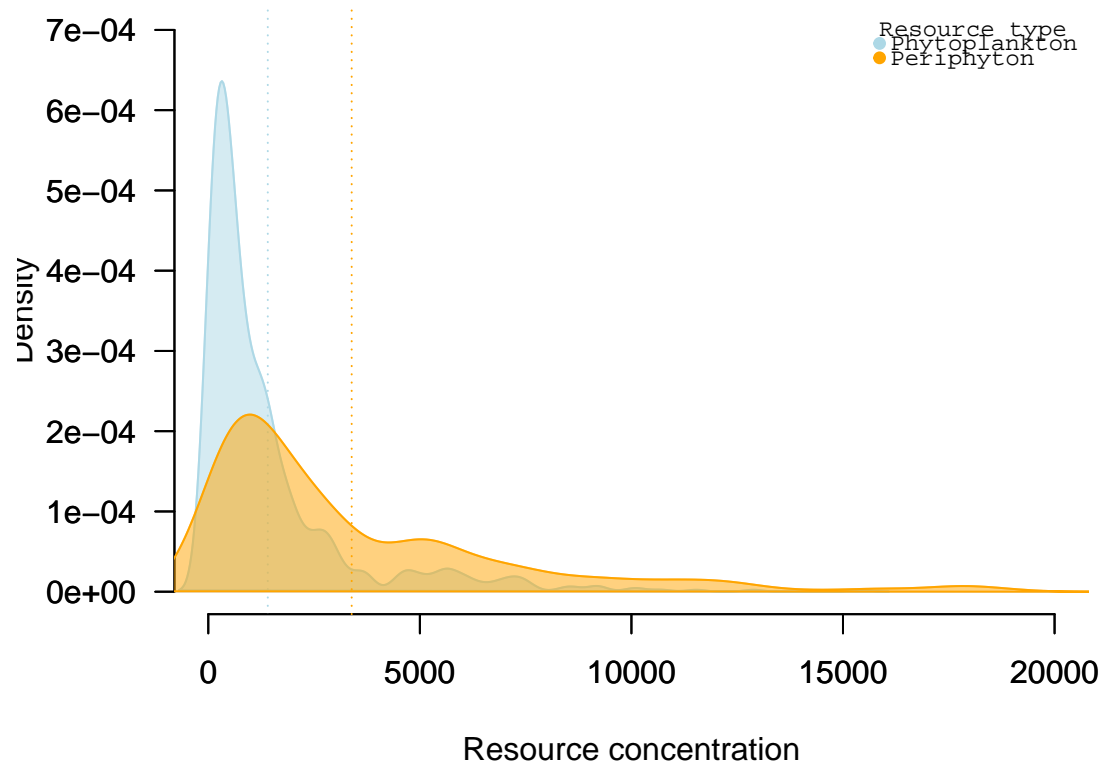


Phyto and Peri Distribution

phyto = fluorescence units

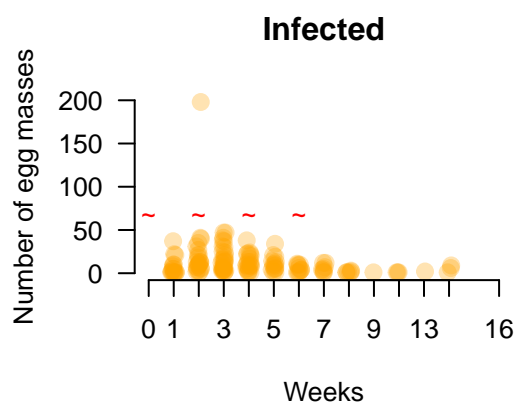
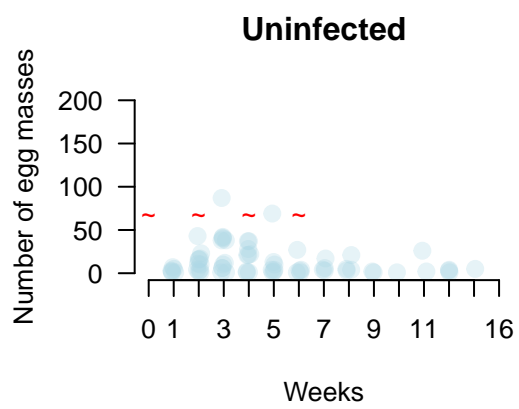
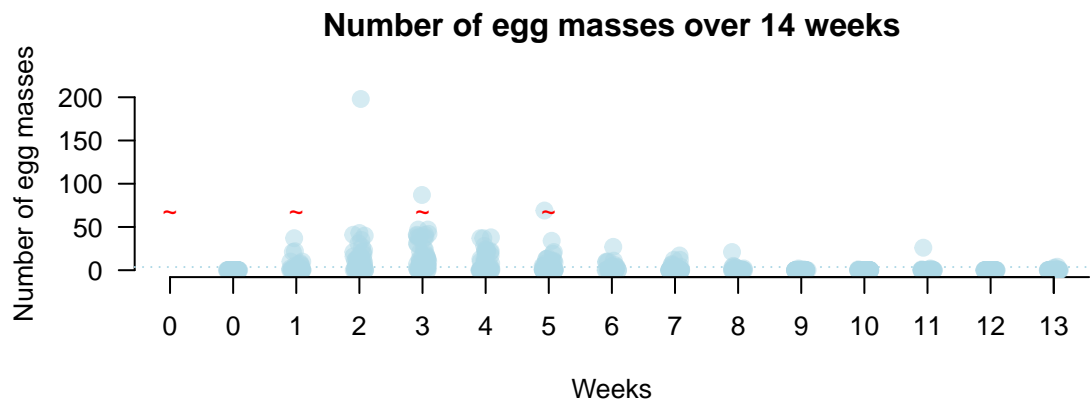
peri = fluorescence per 2 weeks / 3.5 inch² tile (gross productivity biomass rate)

Resource concentration over 14 weeks



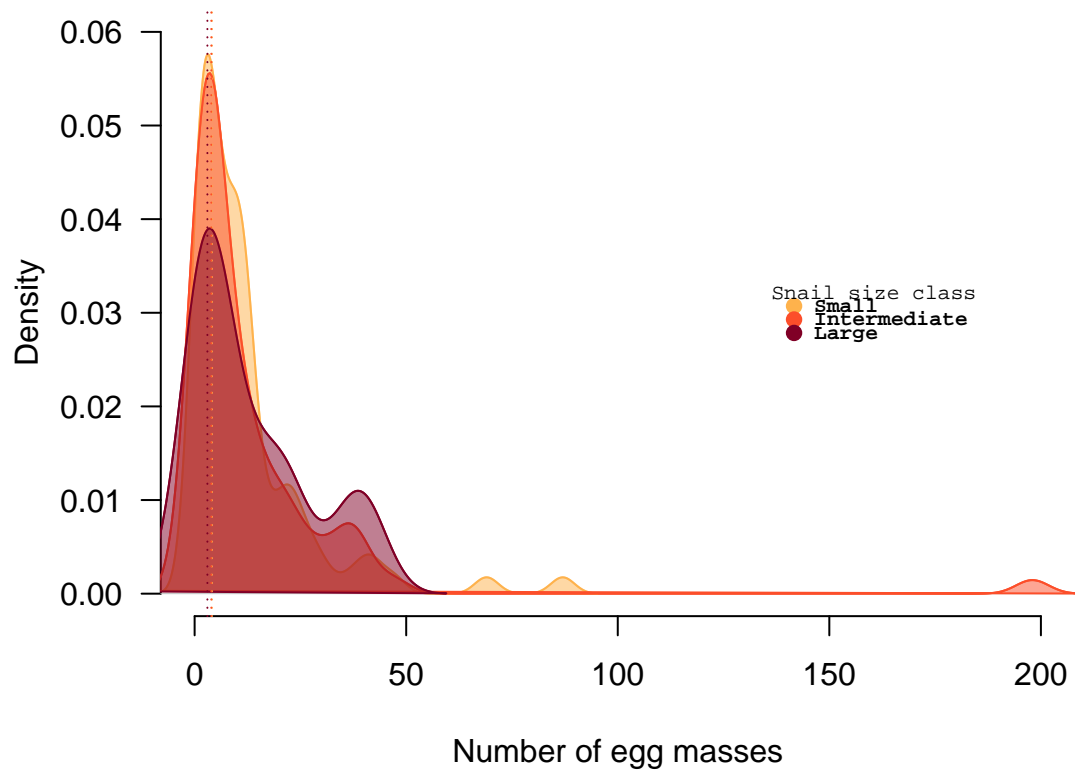
Egg Mass over time v presence of schisto

~1000 eggs inoculated at 0,2,4,6 weeks



Size class vs Egg mass (with schisto)

Number of egg masses for each snail size class



```
xchar= 4.765 ; (yextra,ychar)= -0.001435 0.001435  
points2( 141.7 141.7 141.7 , 0.03072 0.02928 0.02785 , pch= 20 20 20 , ...)
```

Egg Mass over time (weeks)

~1000 eggs inoculated at 0,2,4,6 weeks

