Weight Vs Colony Size Results with instar as numeric

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29 August, 2017

### Leg length against colony size

The final model included the two-way interaction instar age by instar sex and colony size by instar age.

After confirming, not surprisingly, that leg length was highly correlated with instar age

(lmer; 2~4 ,7~= 4339.88, p = < 0.001 \*\*\* ),

we found that leg length increased as colony size increased

(lmer; 25 ,7= 32.68, p = < 0.001 \*\*\* , (figure 3.1),

but, with a significant interaction with instar age

(lmer; 2~6 ,7~= 22.83, p = < 0.001 \*\*\* )

and a significant interaction between instar age and instar sex

(lmer; 26 ,7= 27.35, p = < 0.001 \*\*\* ).

Due to the significant interaction between instar age and colony size we performed tests on each instar individually. We found that leg length increased with colony size in the older instars, but not significantly so in the younger ones (table 3.1) and  
(figure 3.1).

|  |  |  |  |
| --- | --- | --- | --- |
| Instar name | Instar Age | 2 | p value |
| Juvenile | 4 | 1.48 | 0.224 |
| Subadult 1 | 5 | 0.79 | 0.374 |
| Subadult 2 | 6 | 13.64 | < 0.001 \*\*\* |
| Adult | 7 | 8.54 | 0.003 \*\* |

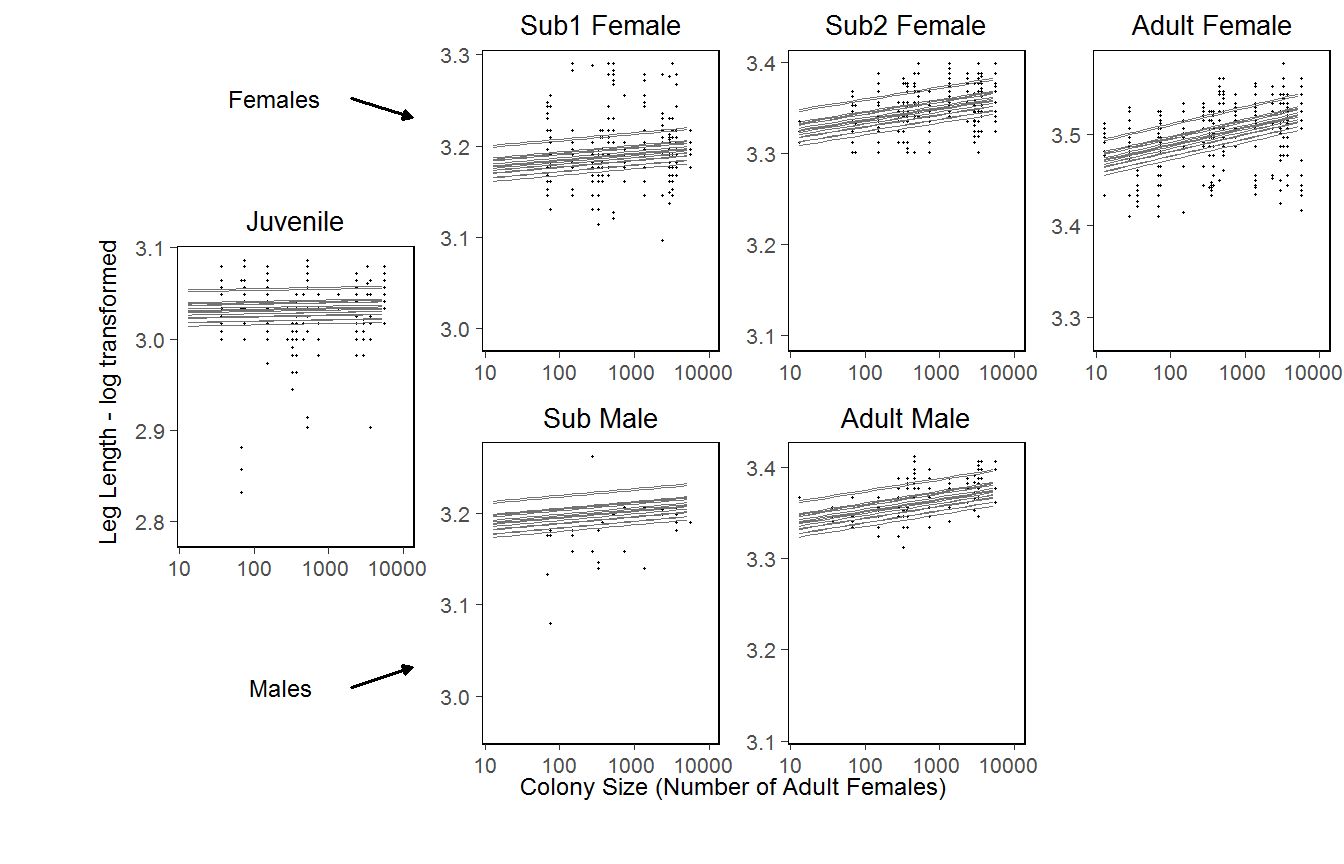
(table 3.1)

TABLE: Results of separate analysis of leg length against colony size for each instar age. Leg length increases with colony size in the overall model

( 2~5 ,7~= 32.68, p = < 0.001 \*\*\* ).

When tested individually the relationship is only significant for the older instars.

Note: If line on graph is blue R could not plot the lmer, plotting a simple lm instead[1] "lmer"



[1] "(figure 3.1)"

FIGURE: Leg length (tiba plus patella) as a function of colony size.

The points represent each individuals measurement and the superimposed lines is the predicted values of full linear model for each random factor i.e. Nest ID

Overall, leg length increased with colony size

()2~5 ,7~= 32.68, p = < 0.001 \*\*\* ),

but with a significant interaction between colony size and instar age

()2~6 ,7~= 22.83, p = < 0.001 \*\*\* )

. When tested individually, only the older instars exhibited a significant relationship. n= 19 colonies.

### Individual condition against colony size

The final linear model for individual condition did not include any interaction effects.

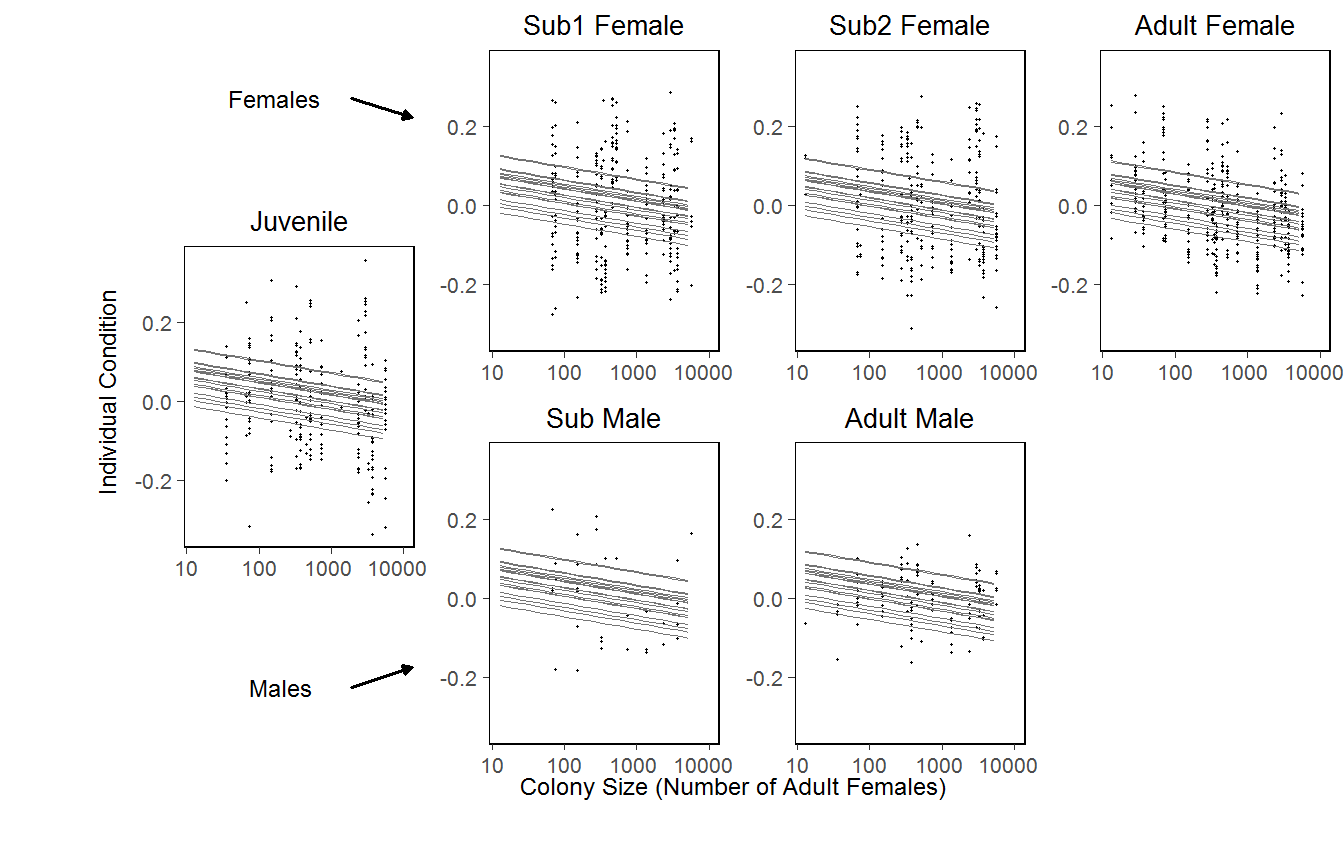
The effect of colony size was significant

(lmer; 24,5 = 4.66, p = 0.031 \* )

with individual condition decreasing as colony size increased (figure 3.2).

, as was instar age (lmer; 24, 5 = 5.81, p = 0.016 \* ), with condition decreasing slighly as instar age increases.

Note: If line on graph is blue R could not plot the lmer, plotting a simple lm instead[1] "lmer"



[1] "(figure 3.2)"

FIGURE : Individual condition against colony size. . Overall condition decreases with colony size

( 2~4, 5~ = 4.66, p =0.031 \* )

### Within-colony variance against colony size

#### Leg length size disparity

There was no significant effect of nest size on within-colony disparity in leg length. However, the average within-colony disparity in leg length was

0.09 0.02,

which is small given that the range of possible values is between zero and one, where zero means complete uniformity in leg length.

#### Body condition disparity

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | (Intercept) | logCtFm | InstarNumber | I(InstarNumber^2) | InstarNumber:InstarSexM |
| L1 | 0 | 1 | 0 | 0 | 0 |

The average within-colony condition disparity was also small at

0.07 0.02.

However, there were significant fixed effects.

The final model included the square of instar age and the two way the interaction instar age by instar.

Colony size had a significant effect

(glmmPQR; 21 = 4.333, p = 0.037 \*)

as within-colony body condition disparity decreased with increasing colony size (figure 3.3).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | (Intercept) | logCtFm | InstarNumber | I(InstarNumber^2) | InstarNumber:InstarSexM |
| L1 | 0 | 0 | 0 | 0 | 1 |

The interaction instar age by sex was significant

(glmmPQR; 21 = 35.468, p = 0 \*\*\*),

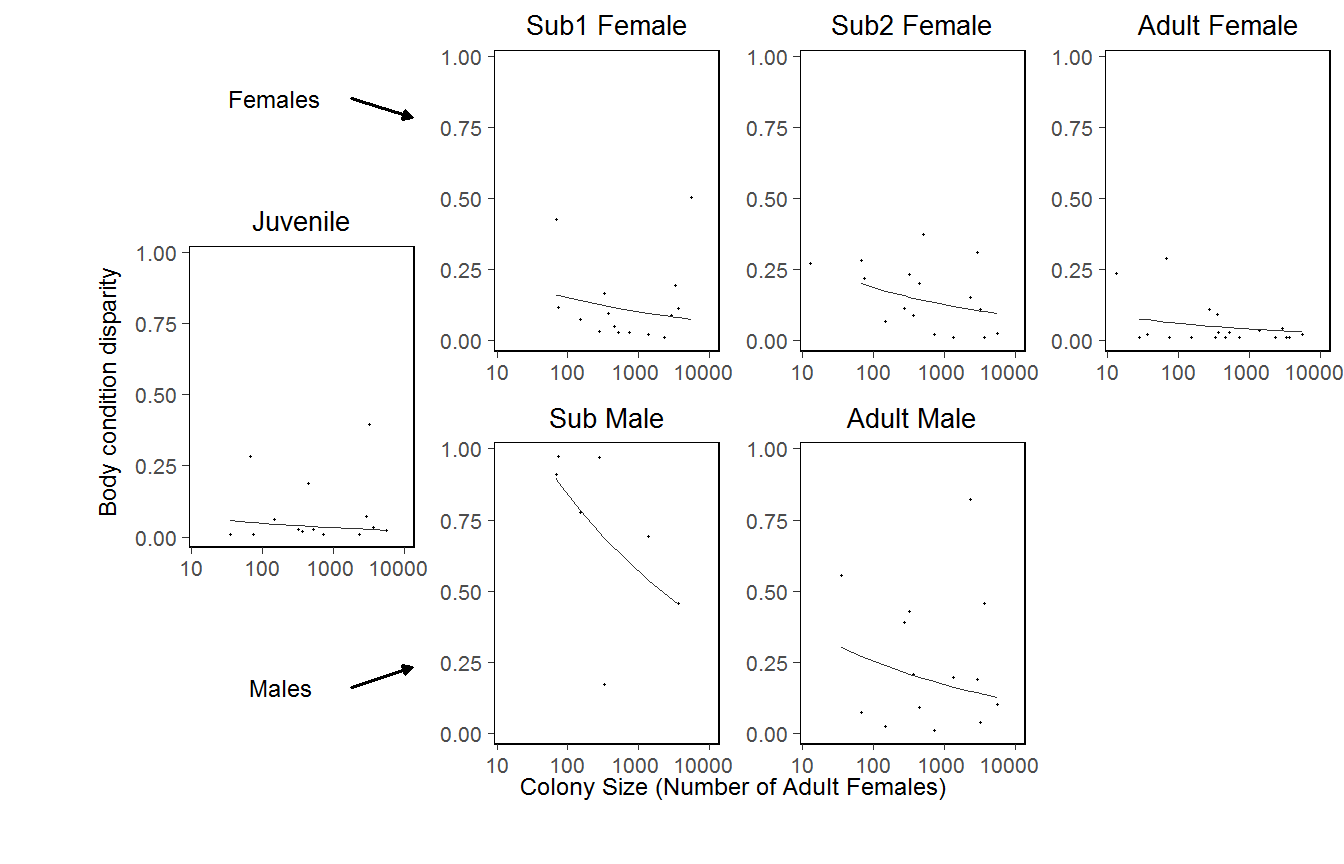
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | (Intercept) | logCtFm | InstarNumber | I(InstarNumber^2) | InstarNumber:InstarSexM |
| L1 | 0 | 0 | 0 | 1 | 0 |

as was instar age squared

(glmmPQR; 21 = 9.015, p = 0.003 \*\* (figure 3.3)).

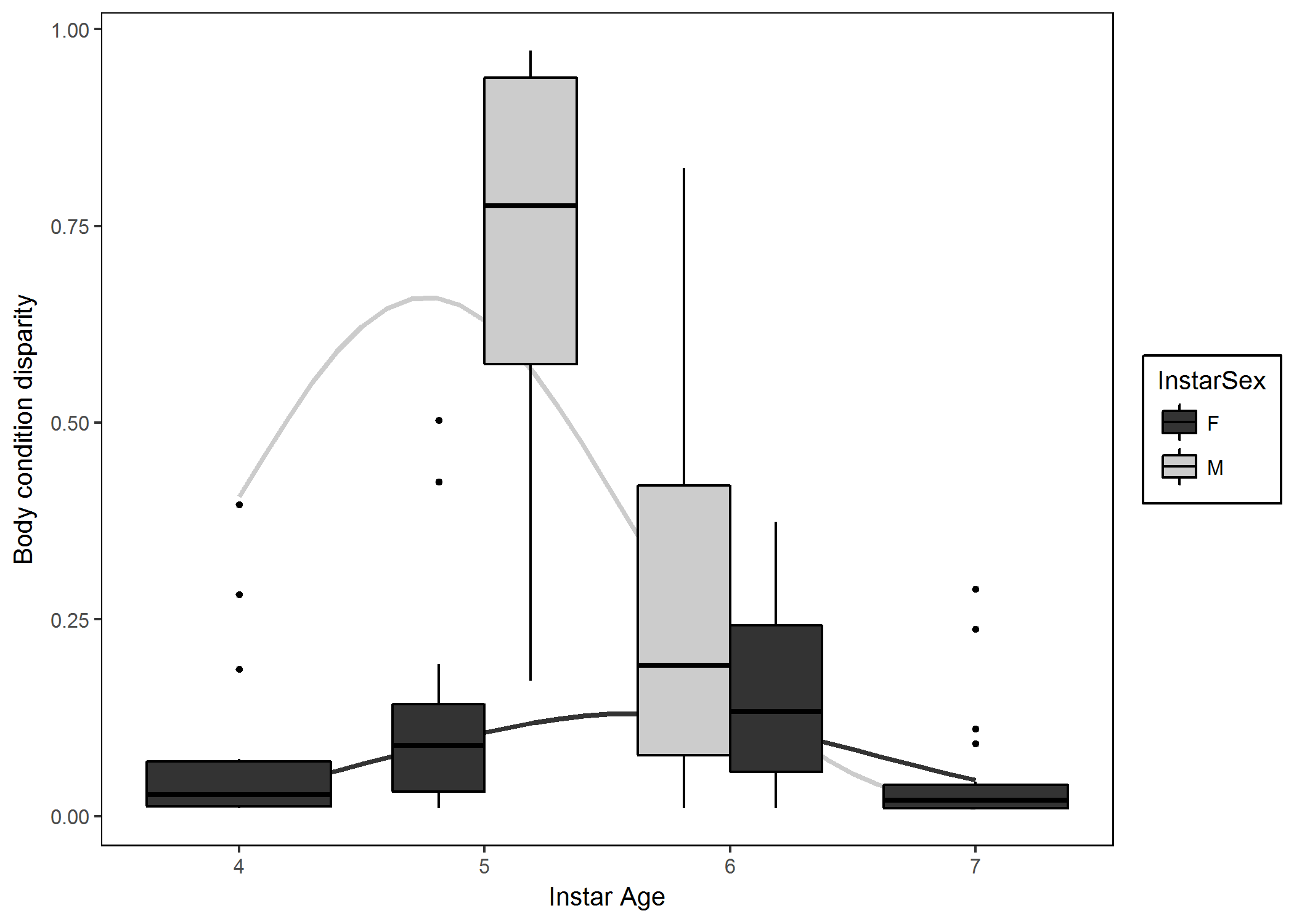
Within-colony variance in condition peaked at intermediate instar ages and was higher for males (figure 3.4).

Note: If line on graph is blue R could not plot the lmer, plotting a simple lm instead[1] "glmmpql"



[1] "(figure 3.3)"

\_FIGURE : Within-colony condition disparity (asin transformed) against colony size with the results of the generalized linear model for individual instars superimposed. Colony size had a significant effect on condition variance (p = 0.037 \*).\_



[1] "(figure 3.4)"

\_FIGURE :Within-colony condition variance as a function of instar age and sex. Overlaid is the generalized linear model, which has the square of instar age as a significant term 21 = 9.015, p = 0.003 \*\* (figure 3.3).

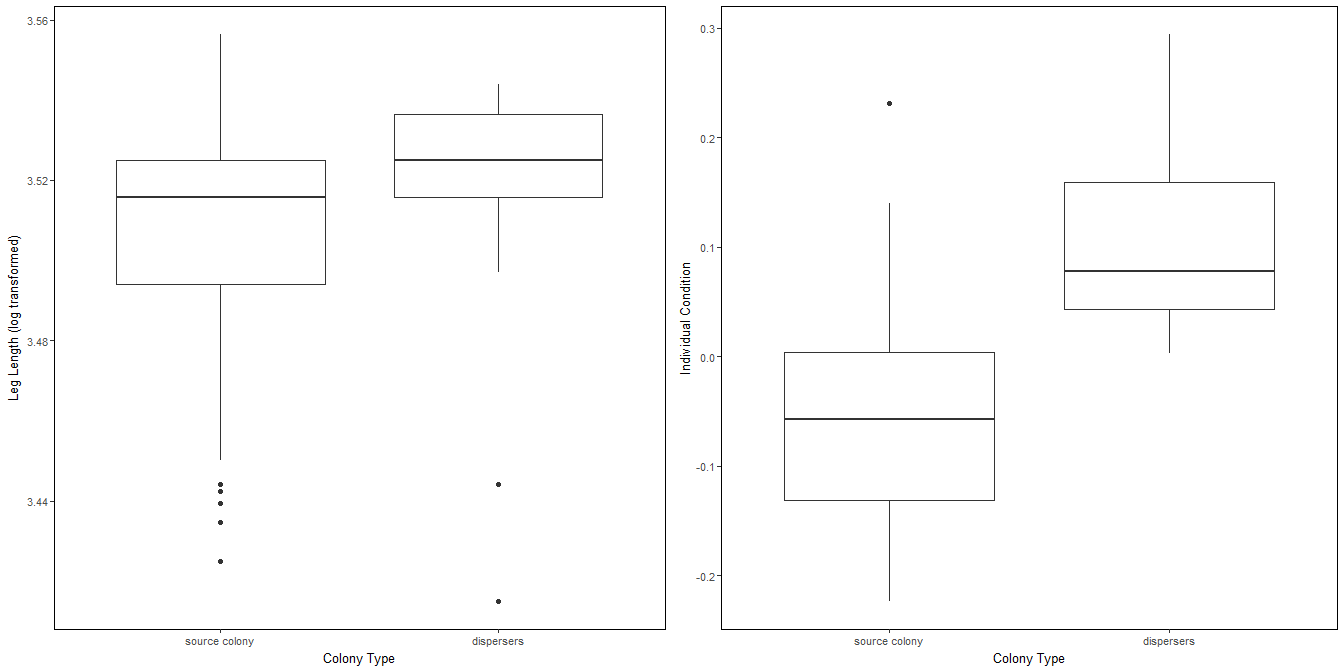
### Size and condition of dispersers

Adult female leg length was larger (lmer; 24,5= 3.9, p = 0.048 \* ),

and their individual condition greater

(lmer; 24,5= 9.45, p = 0.002 \*\* ),

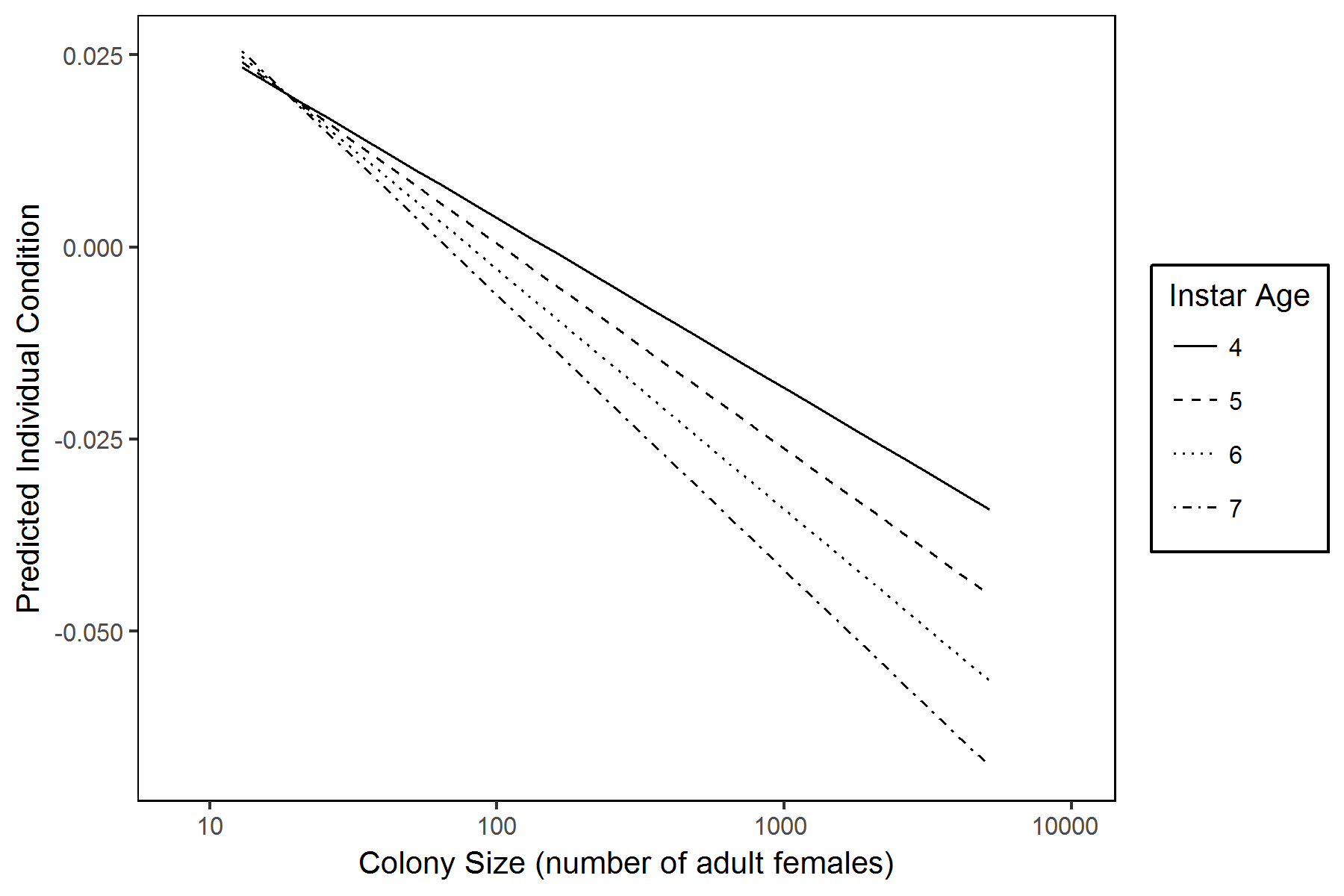
when dispersed in propagules compared to adult females in their natal colonies (figure 3.5).



[1] "(figure 3.5)"

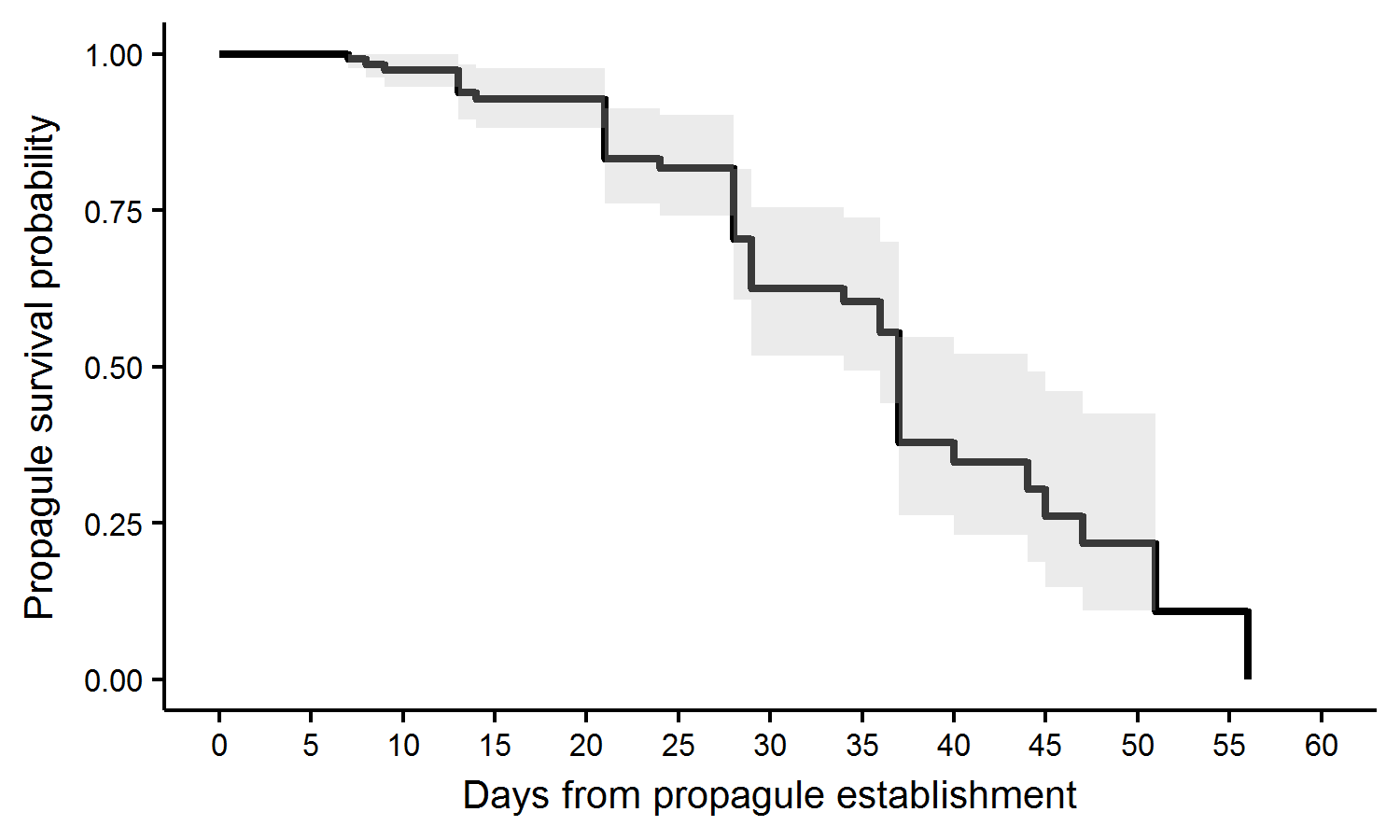
*FIGURE: Leg length and individual condition of adult females in propagules compared to adult females in their natal colony following dispersal. There was a significant difference between the two for both variables (leg lengh: stats, condition: stats), n source colonies = 2, n propagules = 39*

## Instar Age x nest size Interaction Graph



### Single female colony survival

We found that propagules established by single females had a very low survival rate, with a mid-life of 37 days and only a ~15% surviving to 50 days after establishment  
(figure 3.6).



[1] "(figure 3.6)"

*FIGURE: The survival function of 40 propagules from 10 source colonies. Grey shading represents the 95% confidence interval.*