Mericarp Morphology Preliminary Results

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Preliminary data

Model used -> trait ~ mainland + year_collected

This model was used per trait. These are the results of the raw data models. But transformed traits are included in the code.

```
Anova(length_full_raw)
```

```
## Anova Table (Type II tests)
##
## Response: length
##                 Sum Sq   Df F value    Pr(>F)
## mainland_island  179.6    1 103.735 < 2.2e-16 ***
## year_collected    42.3    1  24.425 7.975e-07 ***
## Residuals       8759.9 5061
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Anova(width_full_raw)
```

```
## Anova Table (Type II tests)
##
## Response: width
##                  Sum Sq   Df F value   Pr(>F)
## mainland_island   30.94    1  66.425 4.54e-16 ***
## year_collected    16.82    1  36.125 1.98e-09 ***
## Residuals       2357.05 5061
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Anova(depth_full_raw)
```

```
## Anova Table (Type II tests)
##
## Response: depth
##                 Sum Sq   Df F value    Pr(>F)
## mainland_island  277.8    1 391.928 < 2.2e-16 ***
## year_collected    65.8    1  92.858 < 2.2e-16 ***
```

```
## Residuals       3338.3 4710
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Anova(spine_full_raw)
```

```
## Anova Table (Type II tests)
##
## Response: spine_length
##                   Sum Sq   Df F value    Pr(>F)
## mainland_island   345.2    1  94.873 < 2.2e-16 ***
## year_collected    997.9    1 274.280 < 2.2e-16 ***
## Residuals       16611.8 4566
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Anova(tip_dist_full_raw)
```

```
## Anova Table (Type II tests)
##
## Response: tip_distance
##                   Sum Sq   Df F value    Pr(>F)
## mainland_island   180.3    1 18.4687 1.785e-05 ***
## year_collected     70.1    1  7.1805  0.007412 **
## Residuals       27983.9 2866
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Anova(spine_number_full)
```

```
## Analysis of Deviance Table (Type II tests)
##
## Response: spine_num
##                 LR Chisq Df Pr(>Chisq)
## mainland_island    5.829  1    0.01576 *
## year_collected    74.368  1    < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Anova(lower_spines_full)
```

```
## Analysis of Deviance Table (Type II tests)
##
## Response: lower_spines
##                 LR Chisq Df Pr(>Chisq)
## mainland_island   849.27  1  < 2.2e-16 ***
## year_collected     12.77  1  0.0003523 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Model used -> trait ~ finch_beak + year_collected

Finch beak was defined as the islands where there was presence (1) or absence (0) of large ground finches, *G. magnirostris*. Here I am using the raw data. There are some warnings that we may need to check.

```
Anova(length_beak_raw)
```

```
## Anova Table (Type II tests)
##
## Response: length
##                Sum Sq   Df F value    Pr(>F)
## finch_beak       30.2    1 16.0979 6.133e-05 ***
## year_collected    0.4    1  0.1997     0.655
## Residuals      6983.1 3717
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Anova(width_beak_raw)
```

```
## Anova Table (Type II tests)
##
## Response: width
##                 Sum Sq   Df F value  Pr(>F)
## finch_beak        1.09    1  2.3979 0.12158
## year_collected    1.93    1  4.2394 0.03957 *
## Residuals      1693.29 3717
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Anova(depth_beak_raw)
```

```
## Anova Table (Type II tests)
##
## Response: depth
##                 Sum Sq   Df F value    Pr(>F)
## finch_beak       70.70    1  94.710 < 2.2e-16 ***
## year_collected   20.48    1  27.432 1.727e-07 ***
## Residuals      2512.61 3366
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Anova(spine_beak_raw)
```

```
## Anova Table (Type II tests)
##
## Response: spine_length
##                 Sum Sq   Df  F value Pr(>F)
## finch_beak         8.5    1   1.8851 0.1698
## year_collected   905.0    1 200.7529 <2e-16 ***
## Residuals      15493.4 3437
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
Anova(tip_dist_beak_raw)
```

```
## Anova Table (Type II tests)
##
## Response: tip_distance
##                 Sum Sq   Df F value    Pr(>F)
## finch_beak         9.8    1  0.6888 0.4067099
## year_collected   200.4    1 14.1006 0.0001797 ***
## Residuals      21898.7 1541
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
Anova(spine_number_beak)
```

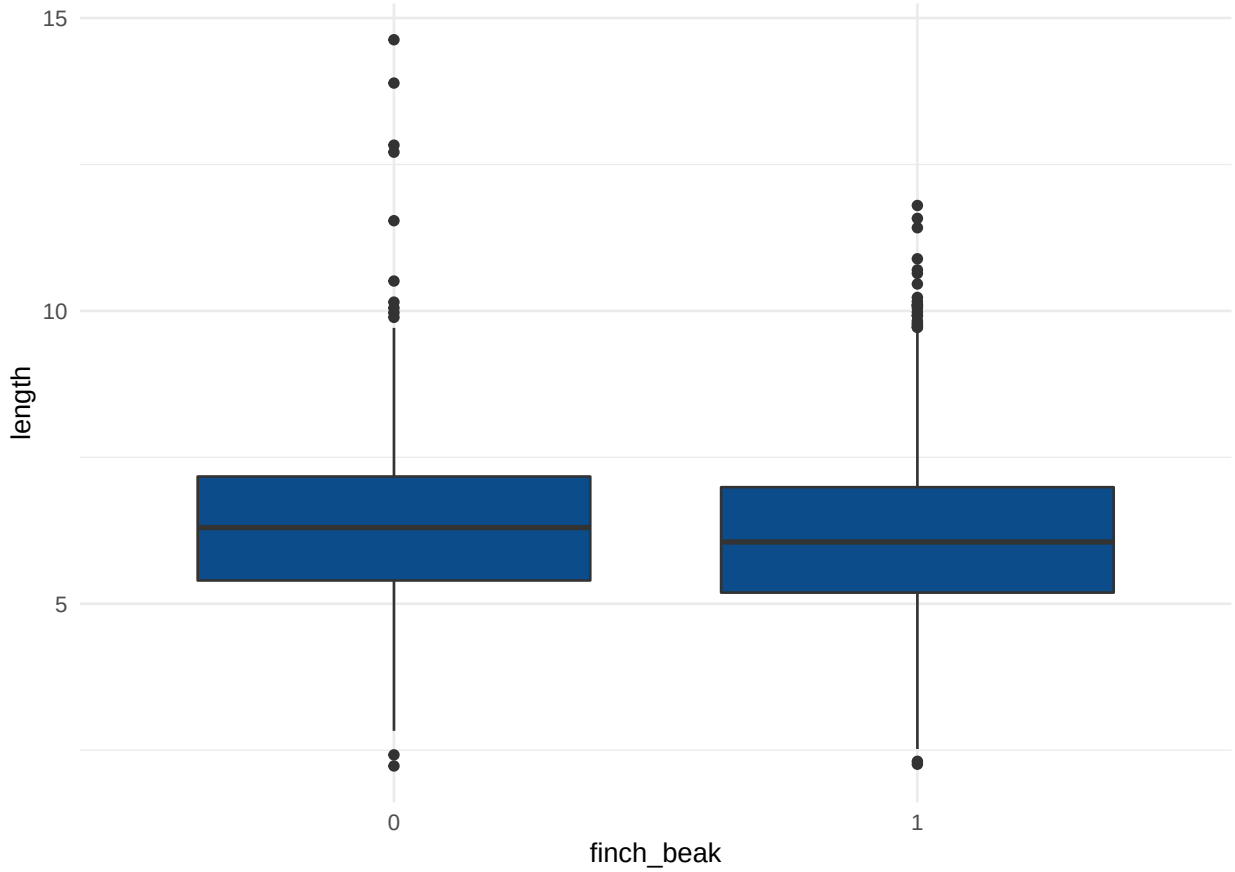
```
## Analysis of Deviance Table (Type II tests)
##
## Response: spine_num
##                LR Chisq Df Pr(>Chisq)
## finch_beak       22.845  1  1.756e-06 ***
## year_collected  111.050  1  < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

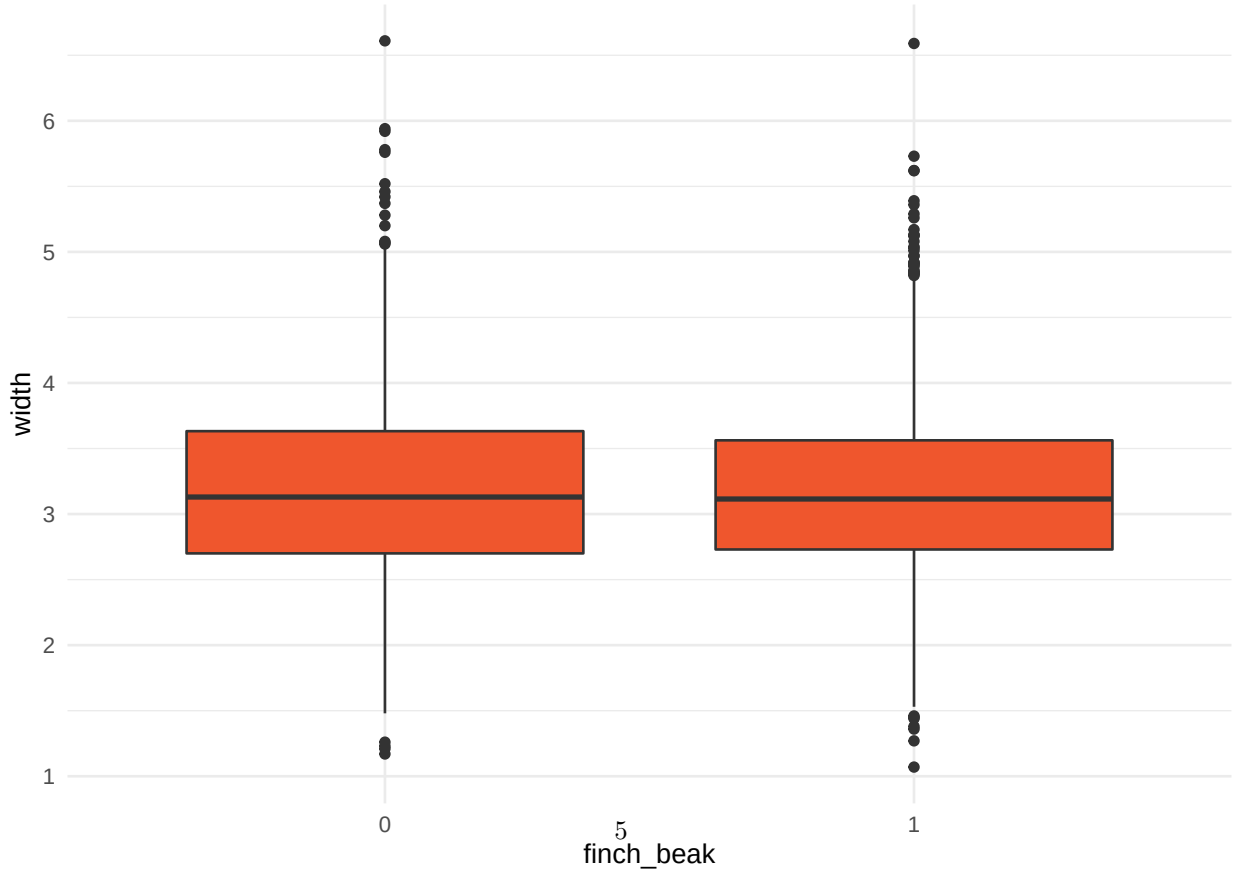
```r
Anova(lower_spines_beak)
```

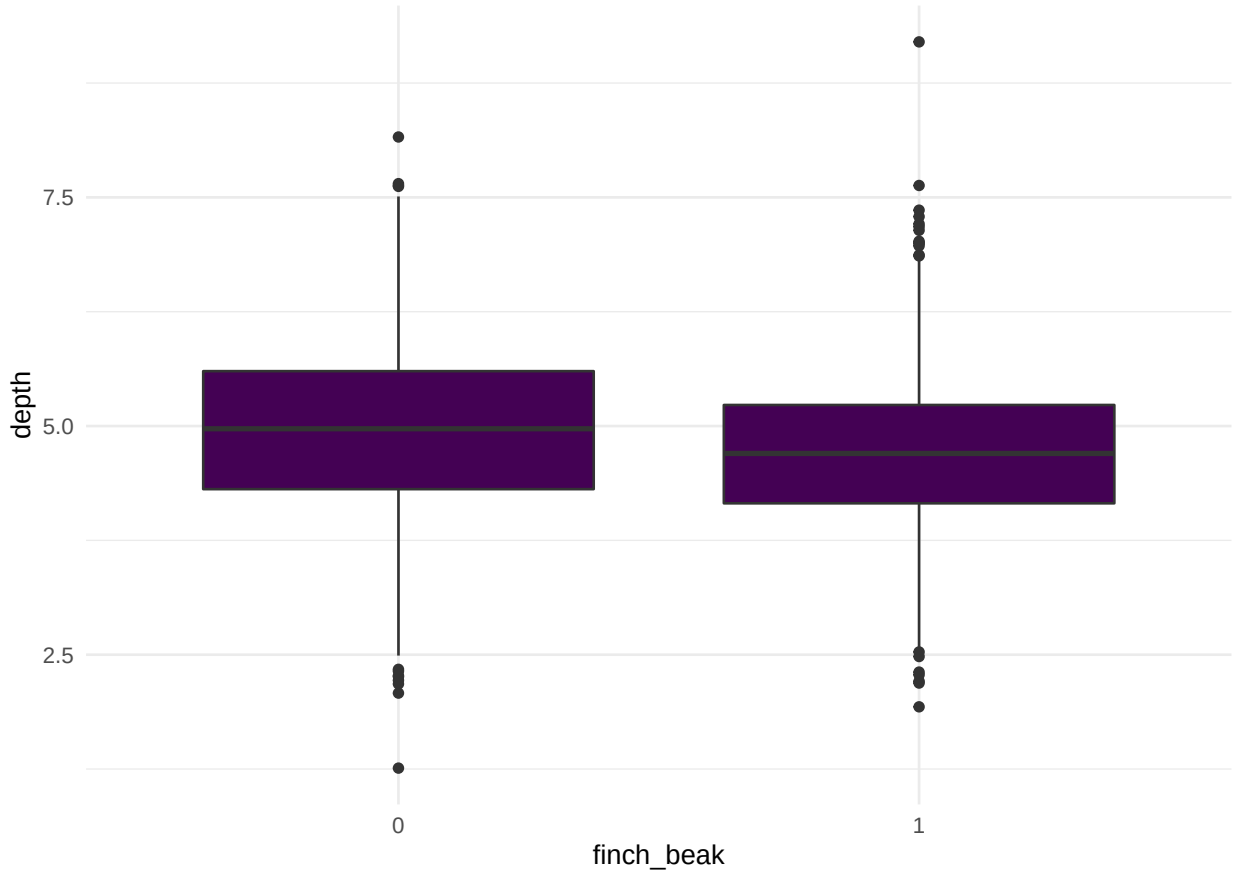
```
## Analysis of Deviance Table (Type II tests)
##
## Response: lower_spines
##                LR Chisq Df Pr(>Chisq)
## finch_beak       411.24  1  < 2.2e-16 ***
## year_collected    25.95  1  3.509e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

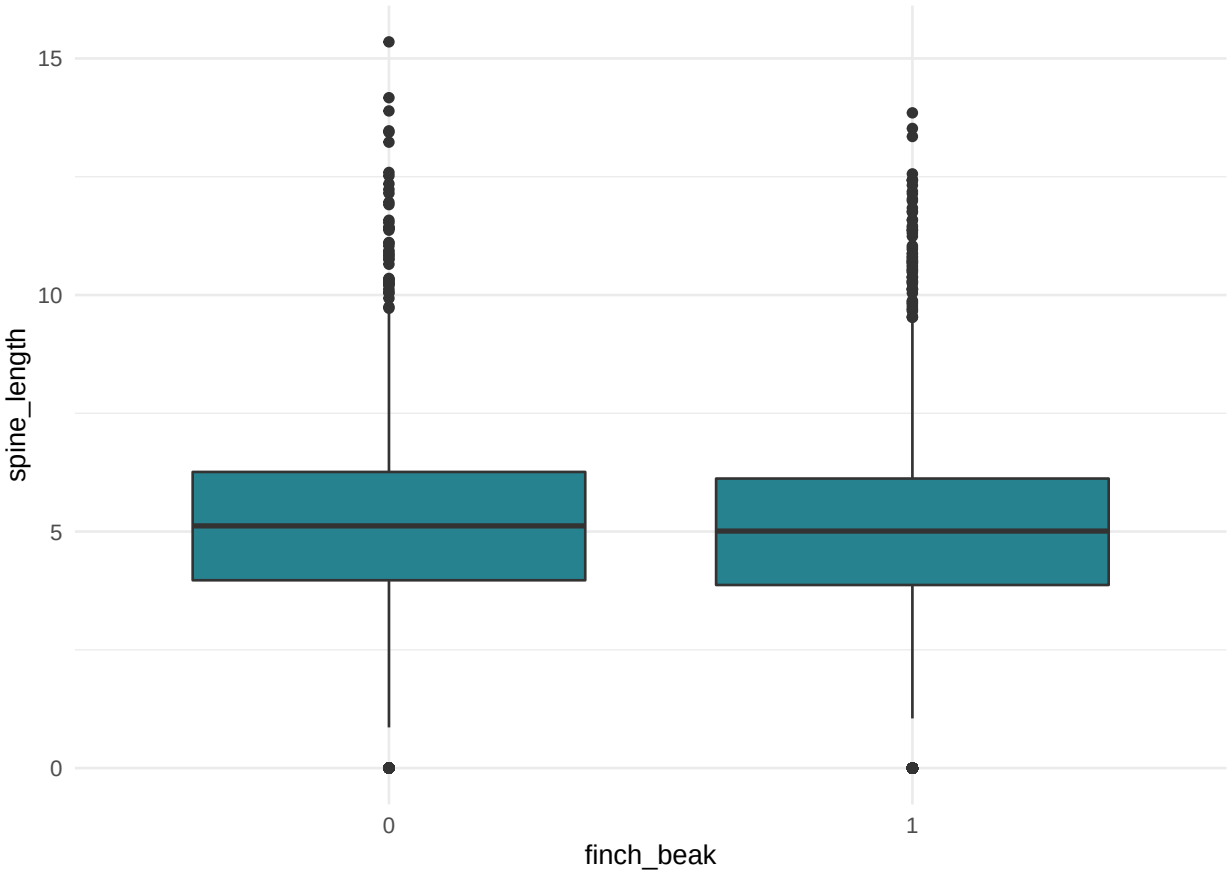
For finch beaks the traits: **width**, **spine length**, and **spine distance** were not significant.

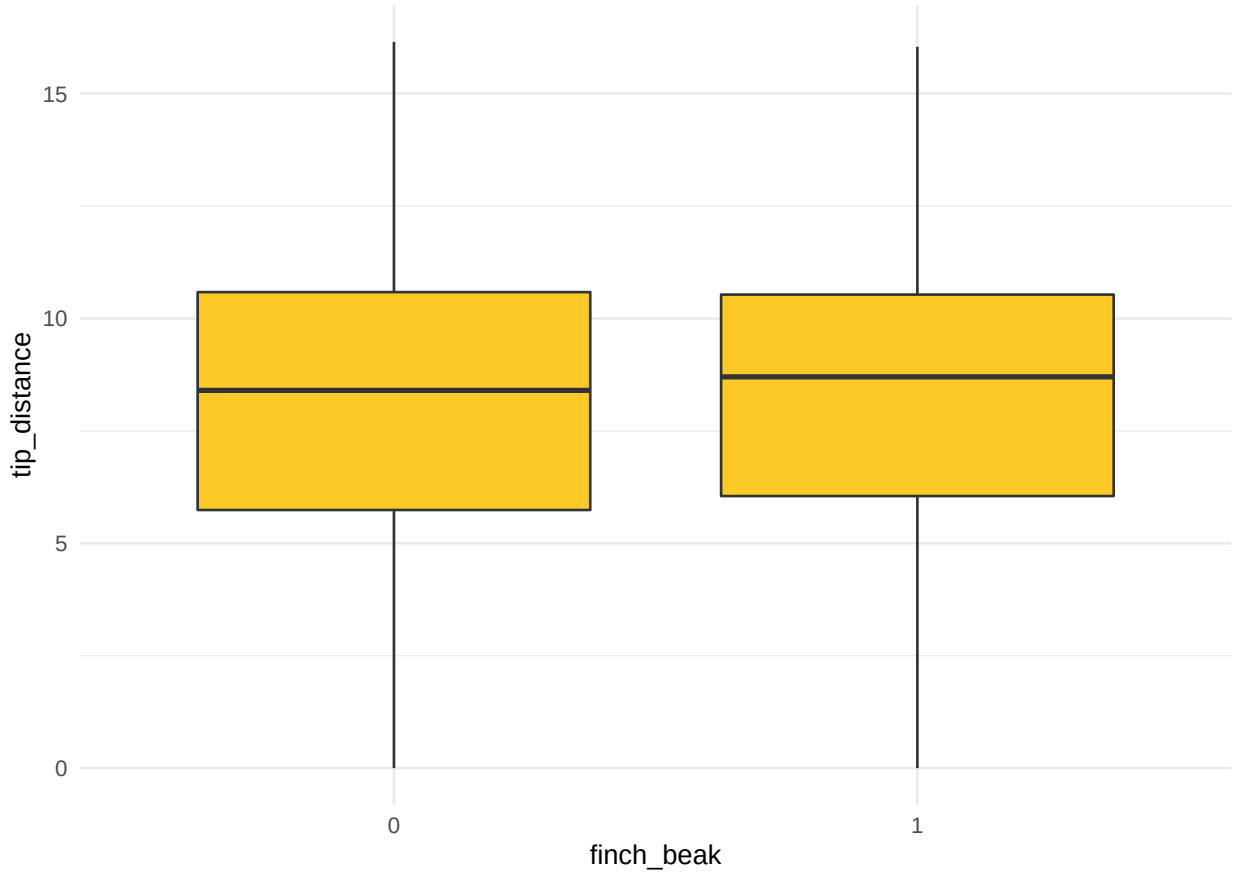
General summary plots

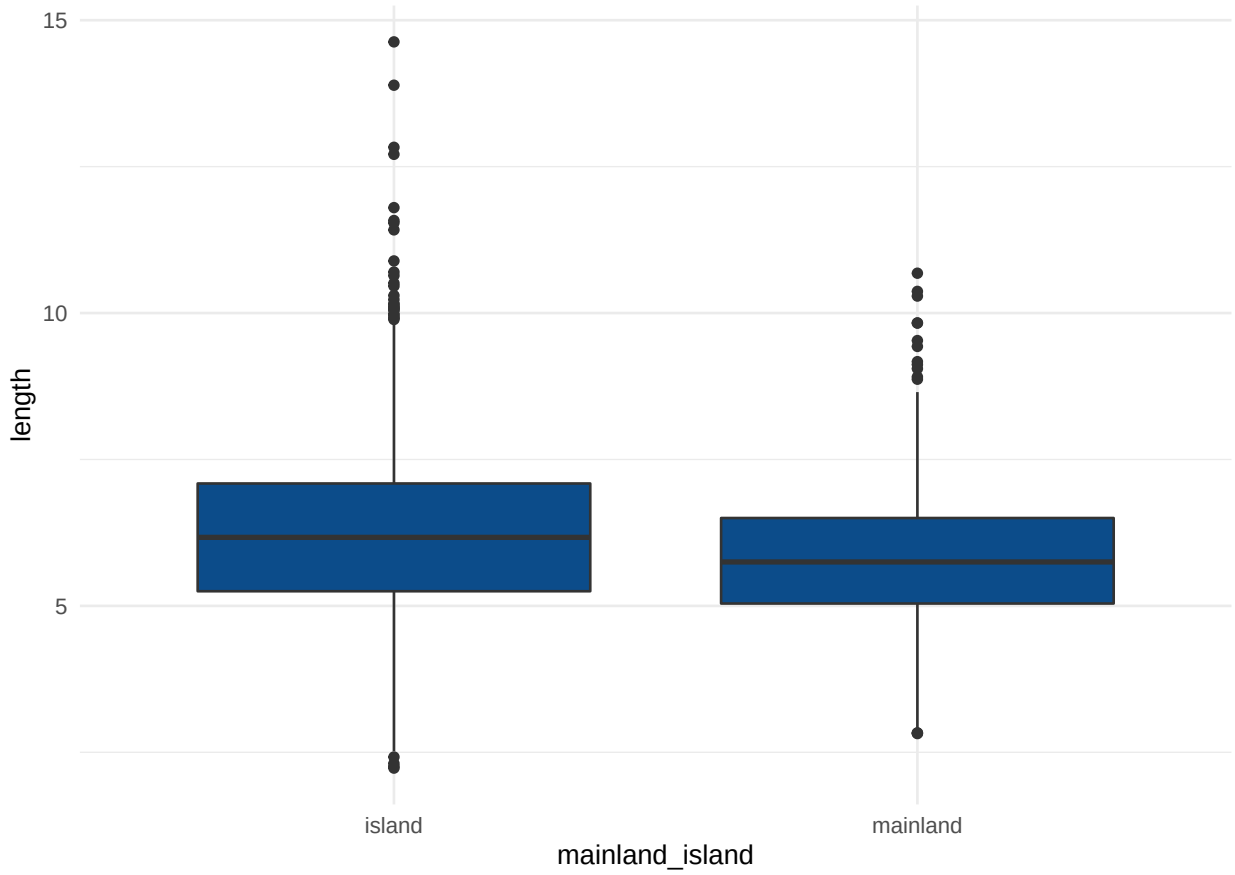


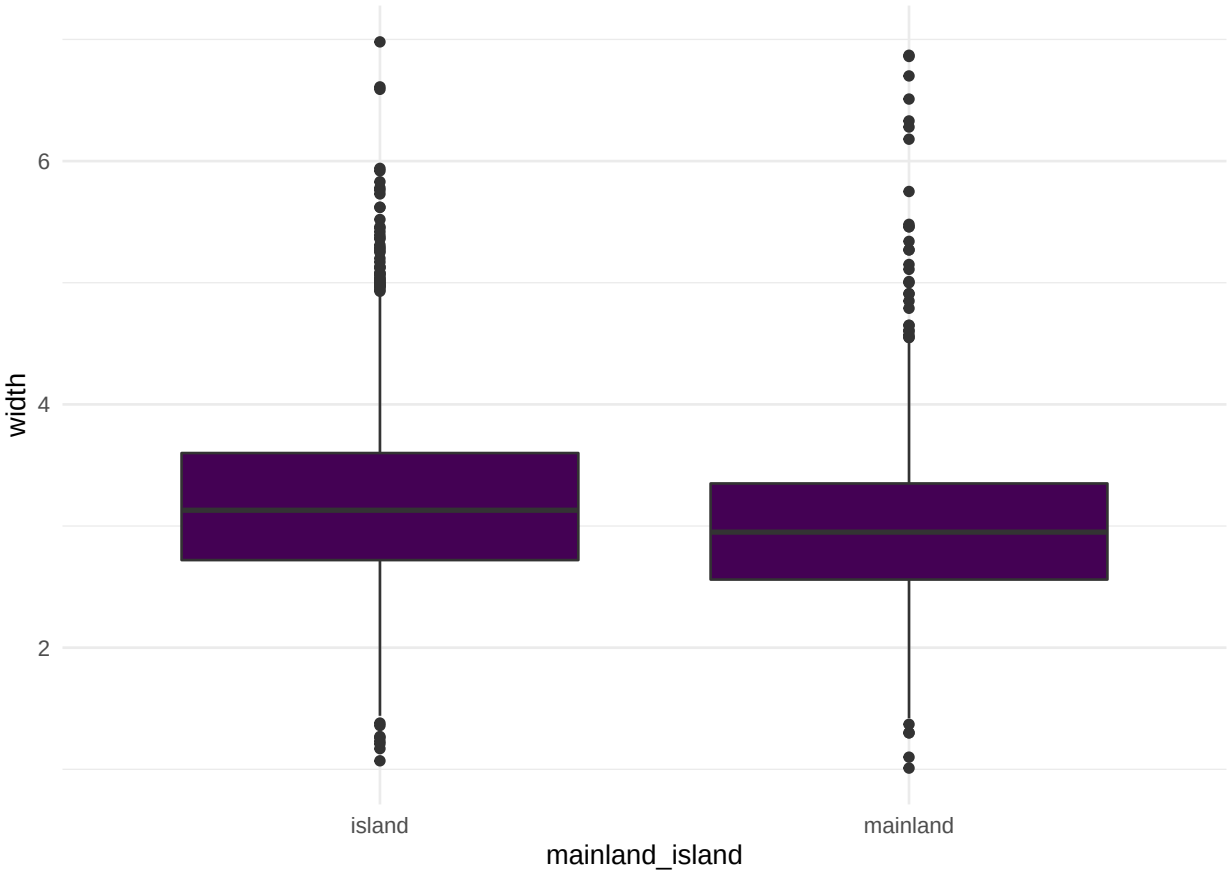



7.5
5.0
2.5
depth
0
1
finch_beak

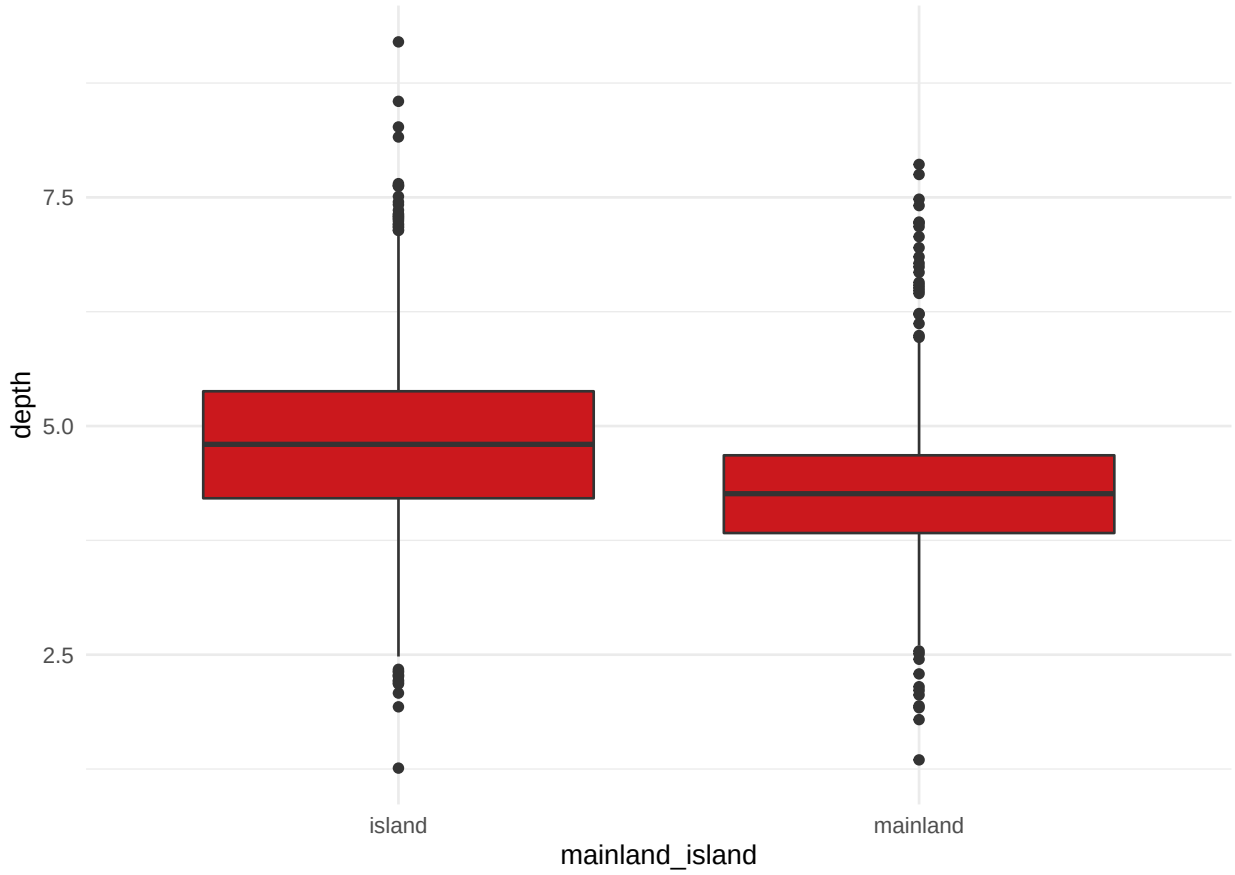

15
10
5
0
spine_length
0
1
finch_beak


15
10
5
0
tip_distance
0
1
finch_beak

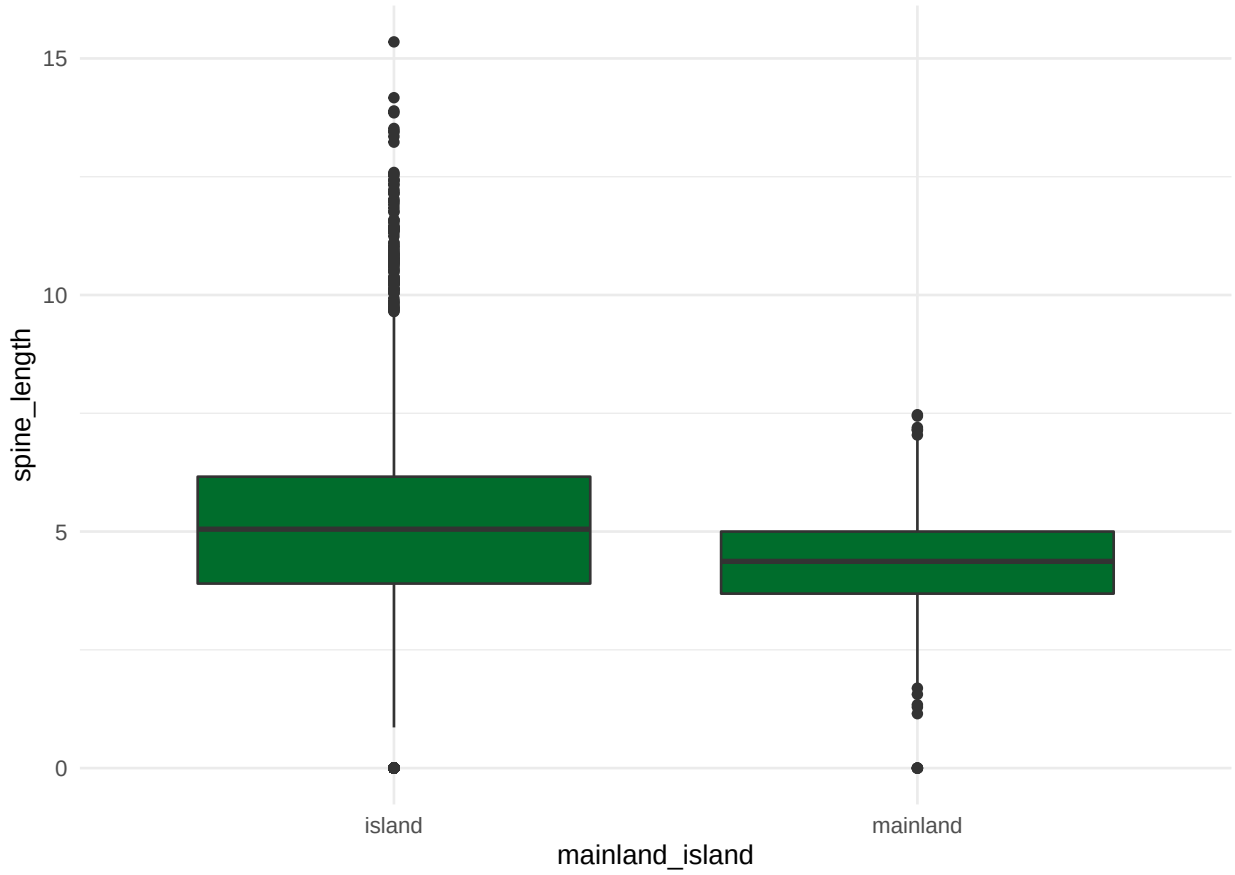

15
10
5
length
island
mainland
mainland_island



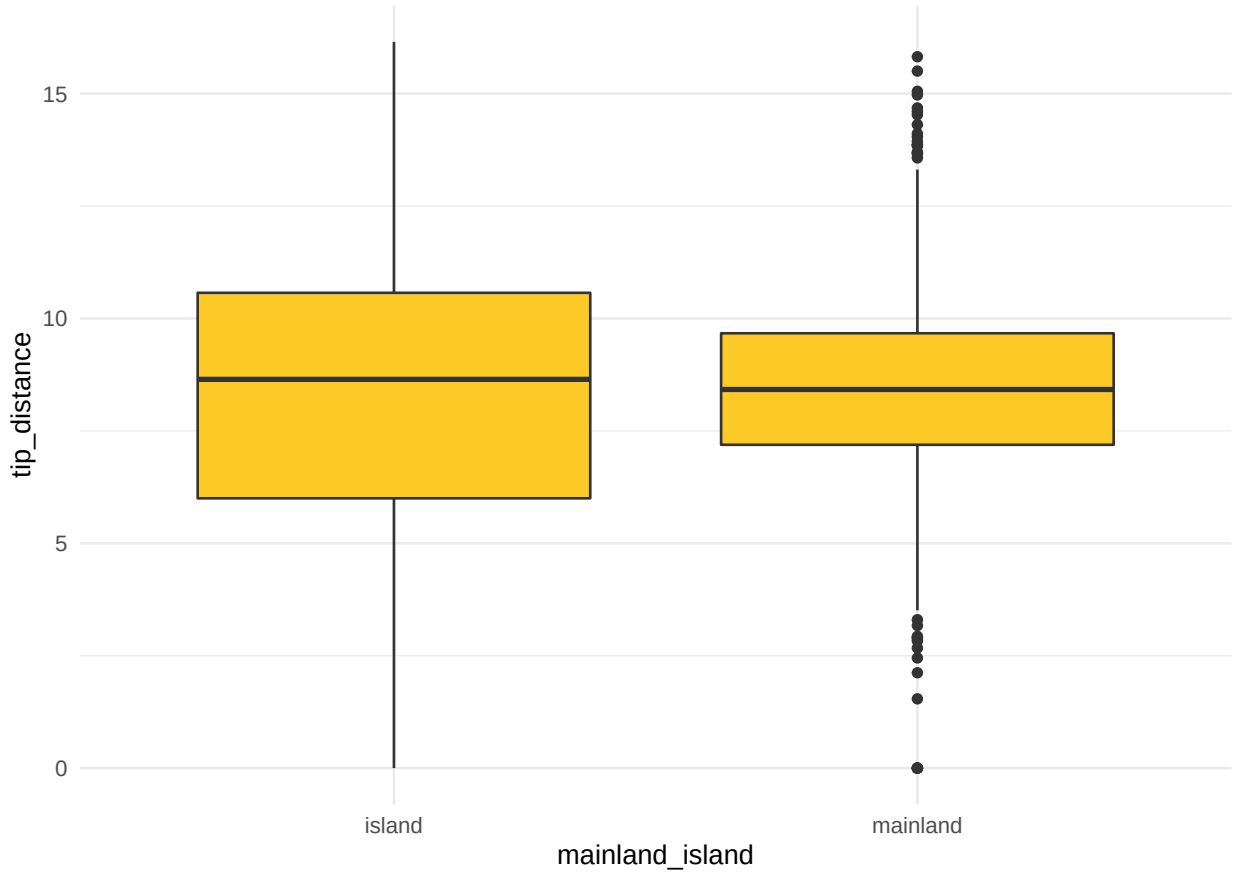

```
## Warning: Removed 351 rows containing non-finite values (stat_boxplot).
```




```
## Warning: Removed 495 rows containing non-finite values (stat_boxplot).
```




```
## Warning: Removed 2195 rows containing non-finite values (stat_boxplot).
```


15
10
5
0
tip_distance
island
mainland
mainland_island