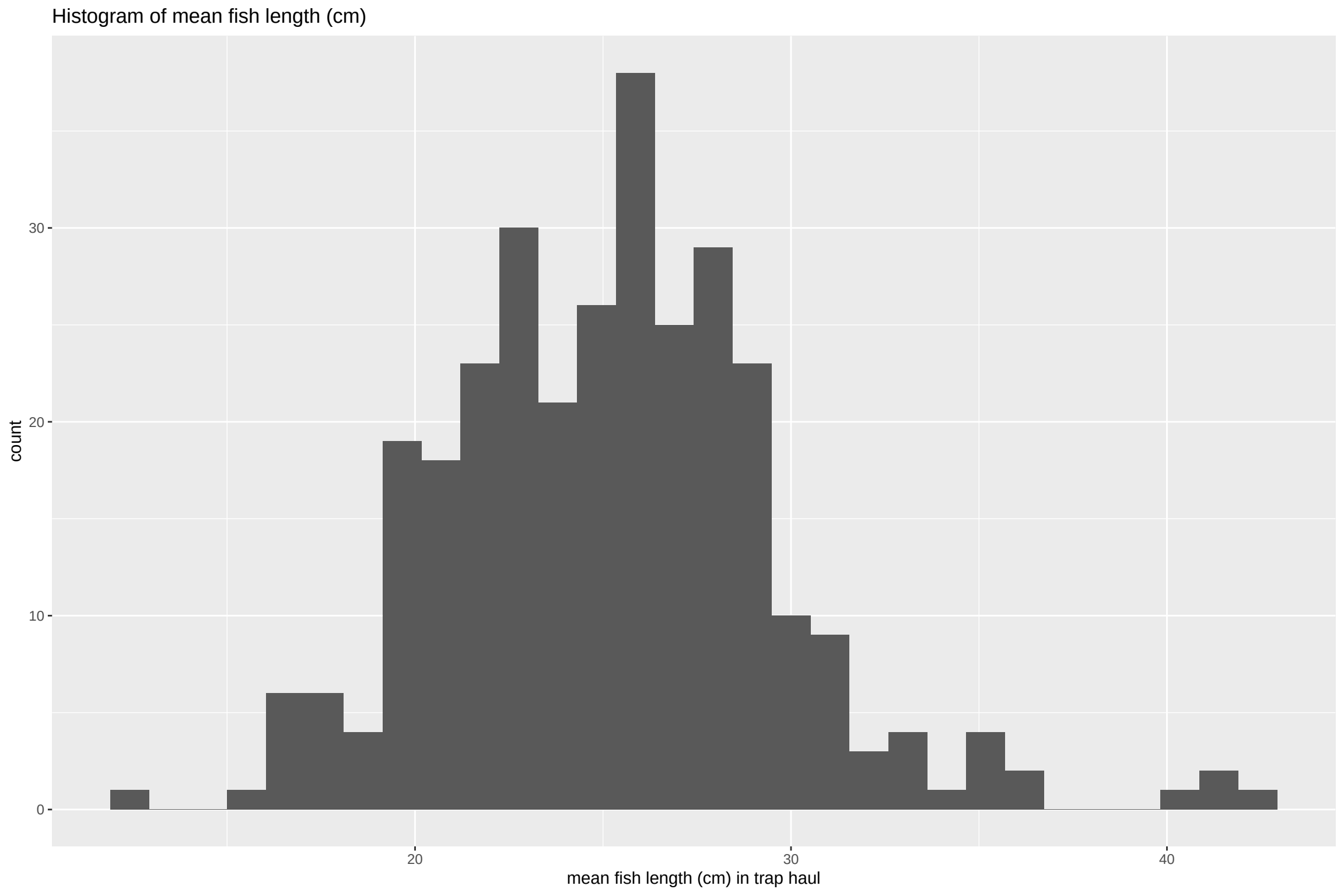
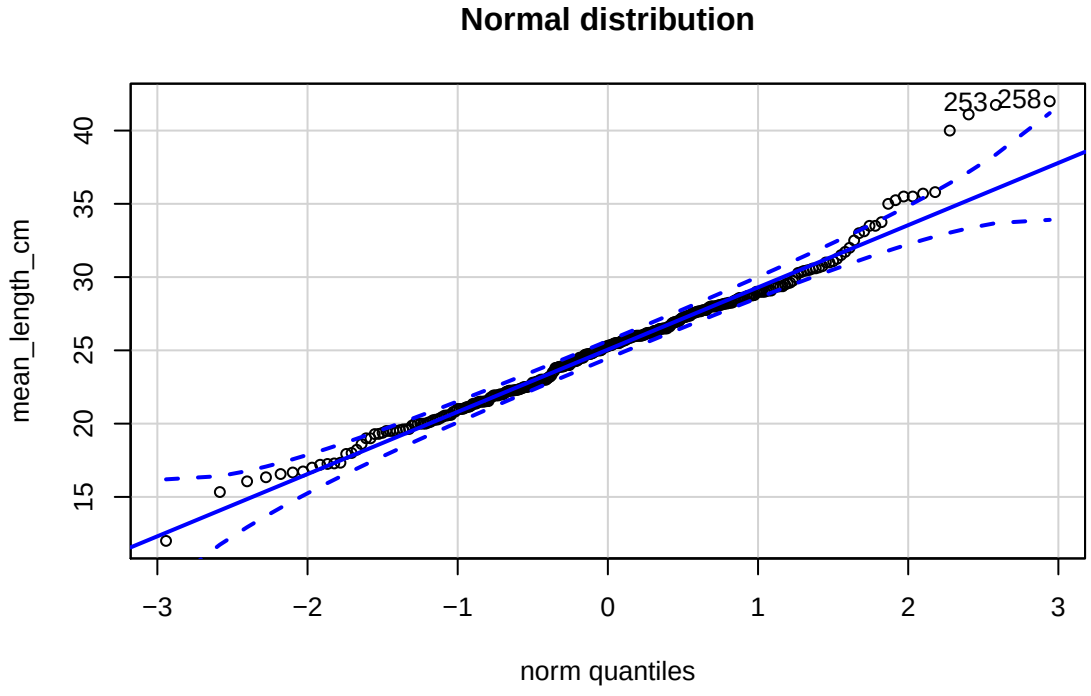
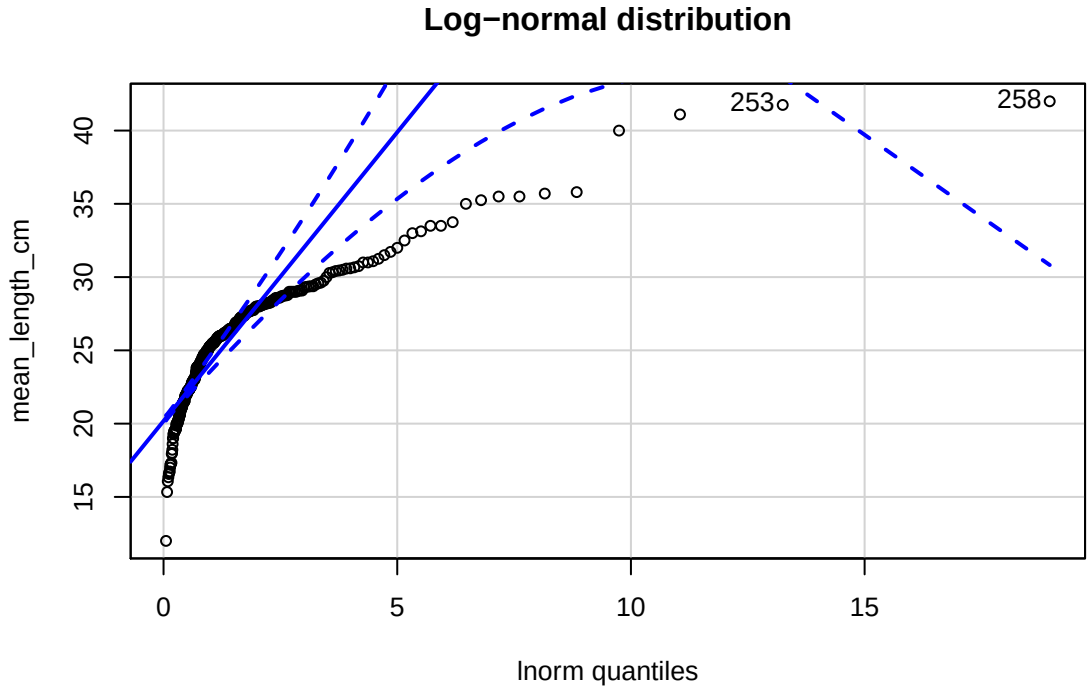
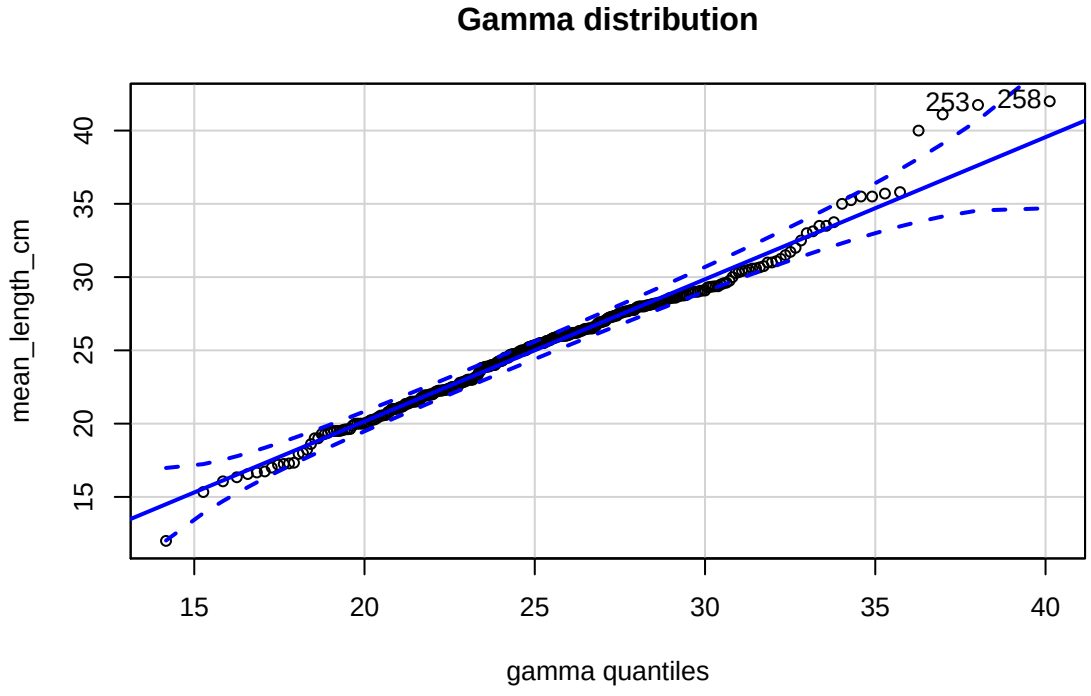

Histogram of mean fish length (cm)
count
0
10
20
30
20
30
40
mean fish length (cm) in trap haul

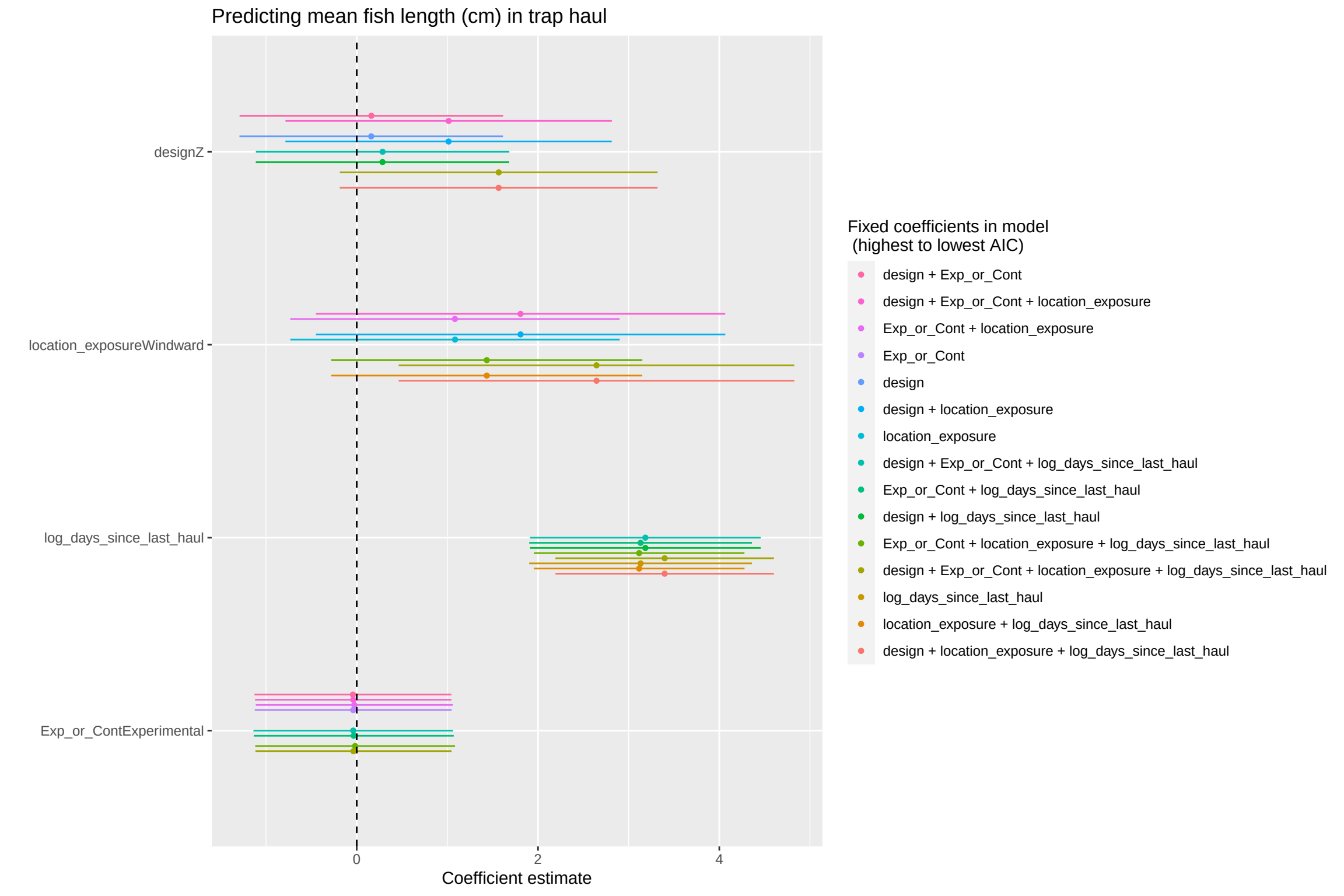

Normal distribution
mean_length_cm
norm quantiles
253
258
15
20
25
30
35
40
−3
−2
−1
0
1
2
3


Log−normal distribution
mean_length_cm
lnorm quantiles
253
258
15
20
25
30
35
40
0
5
10
15


Gamma distribution
mean_length_cm
gamma quantiles
253
258
15
20
25
30
35
40

```
Global model call: lmer(formula = mean_length_cm ~ design + log_days_since_last_haul +
    location_exposure + Exp_or_Cont + (1 | TrapID) + (1 | Date_YMD),
    data = trap_haul_no_zero, REML = FALSE, na.action = "na.fail")
---
Model selection table
   (Int) dsg Exp_or_Cnt lct_exp log_dys_snc_lst_hal df   logLik   AICc
14 17.32   +                  +               2.799  7 -864.667 1743.7
13 19.17                      +               2.567  6 -866.186 1744.7
9  19.31                                      2.581  5 -867.461 1745.1
16 17.34   +          +       +               2.799  8 -864.665 1745.8
15 19.18              +       +               2.568  7 -866.186 1746.7
10 19.00   +                                  2.624  6 -867.385 1747.0
11 19.33              +                       2.580  6 -867.460 1747.2
12 19.02   +          +                       2.624  7 -867.382 1749.1
1  25.08                                             4 -875.401 1758.9
5  24.95                      +                      5 -874.736 1759.7
6  24.09   +                  +                      6 -874.153 1760.6
2  24.95   +                                         5 -875.379 1761.0
3  25.10              +                              5 -875.399 1761.0
7  24.97              +       +                      6 -874.734 1761.7
8  24.11   +          +       +                      7 -874.151 1762.7
4  24.97   +          +                              6 -875.376 1763.0
   delta weight
14  0.00  0.321
13  0.94  0.200
9   1.41  0.158
16  2.10  0.112
15  3.04  0.070
10  3.34  0.060
11  3.49  0.056
12  5.43  0.021
1  15.23  0.000
5  15.96  0.000
6  16.88  0.000
2  17.25  0.000
3  17.29  0.000
7  18.04  0.000
8  18.97  0.000
4  19.32  0.000
Models ranked by AICc(x)
Random terms (all models):
'1 | TrapID', '1 | Date_YMD'
```

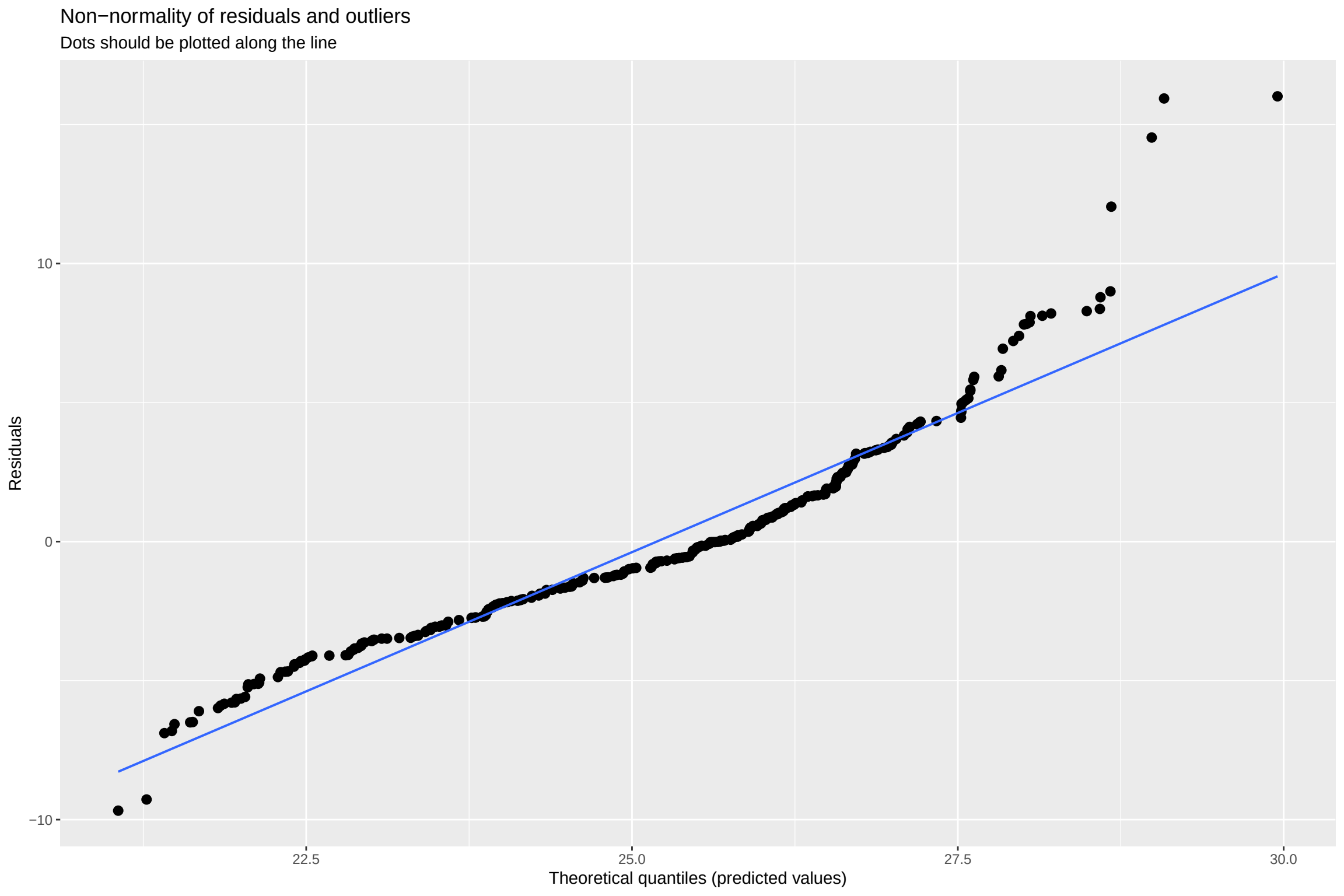
model	sigma	logLik	AIC	BIC	deviance	df.residual
design + location_exposure + log_days_since_last_haul	3.90	−864.67	1743.33	1769.42	1729.33	300
location_exposure + log_days_since_last_haul	3.91	−866.19	1744.37	1766.73	1732.37	301
log_days_since_last_haul	3.91	−867.46	1744.92	1763.56	1734.92	302
design + Exp_or_Cont + location_exposure + log_days_since_last_haul	3.90	−864.67	1745.33	1775.15	1729.33	299
Exp_or_Cont + location_exposure + log_days_since_last_haul	3.91	−866.19	1746.37	1772.46	1732.37	300
design + log_days_since_last_haul	3.91	−867.38	1746.77	1769.13	1734.77	301
Exp_or_Cont + log_days_since_last_haul	3.91	−867.46	1746.92	1769.28	1734.92	301
design + Exp_or_Cont + log_days_since_last_haul	3.91	−867.38	1748.76	1774.85	1734.76	300
none	3.91	−875.40	1758.80	1773.71	1750.80	303
location_exposure	3.91	−874.74	1759.47	1778.11	1749.47	302
design + location_exposure	3.89	−874.15	1760.31	1782.67	1748.31	301
design	3.90	−875.38	1760.76	1779.39	1750.76	302
Exp_or_Cont	3.91	−875.40	1760.80	1779.43	1750.80	302
Exp_or_Cont + location_exposure	3.91	−874.73	1761.47	1783.83	1749.47	301
design + Exp_or_Cont + location_exposure	3.89	−874.15	1762.30	1788.39	1748.30	300
design + Exp_or_Cont	3.90	−875.38	1762.75	1785.11	1750.75	301

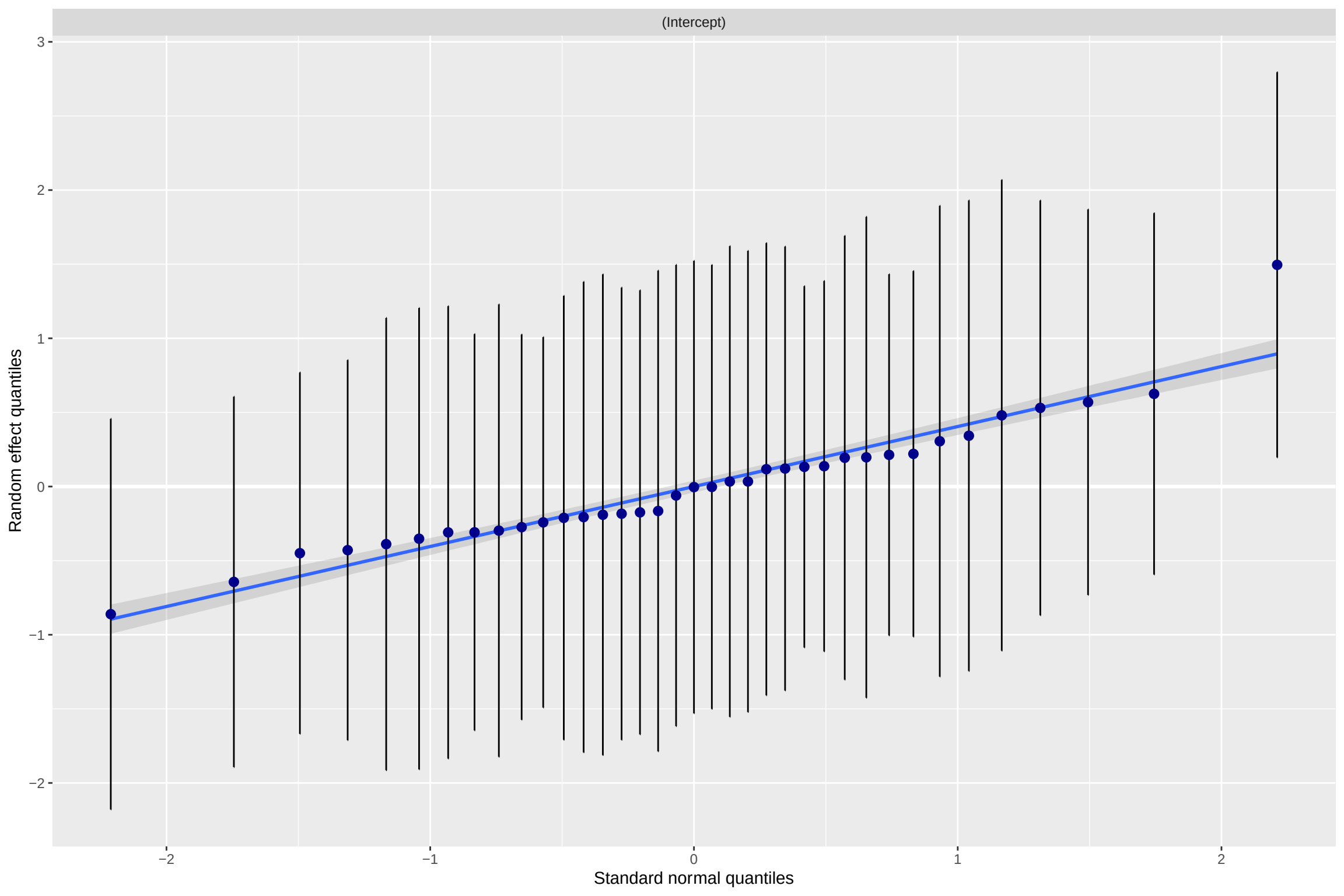

Predicting mean fish length (cm) in trap haul
designZ
location_exposureWindward
log_days_since_last_haul
Exp_or_ContExperimental
0
2
4
Coefficient estimate
Fixed coefficients in model
(highest to lowest AIC)
design + Exp_or_Cont
design + Exp_or_Cont + location_exposure
Exp_or_Cont + location_exposure
Exp_or_Cont
design
design + location_exposure
location_exposure
design + Exp_or_Cont + log_days_since_last_haul
Exp_or_Cont + log_days_since_last_haul
design + log_days_since_last_haul
Exp_or_Cont + location_exposure + log_days_since_last_haul
design + Exp_or_Cont + location_exposure + log_days_since_last_haul
log_days_since_last_haul
location_exposure + log_days_since_last_haul
design + location_exposure + log_days_since_last_haul

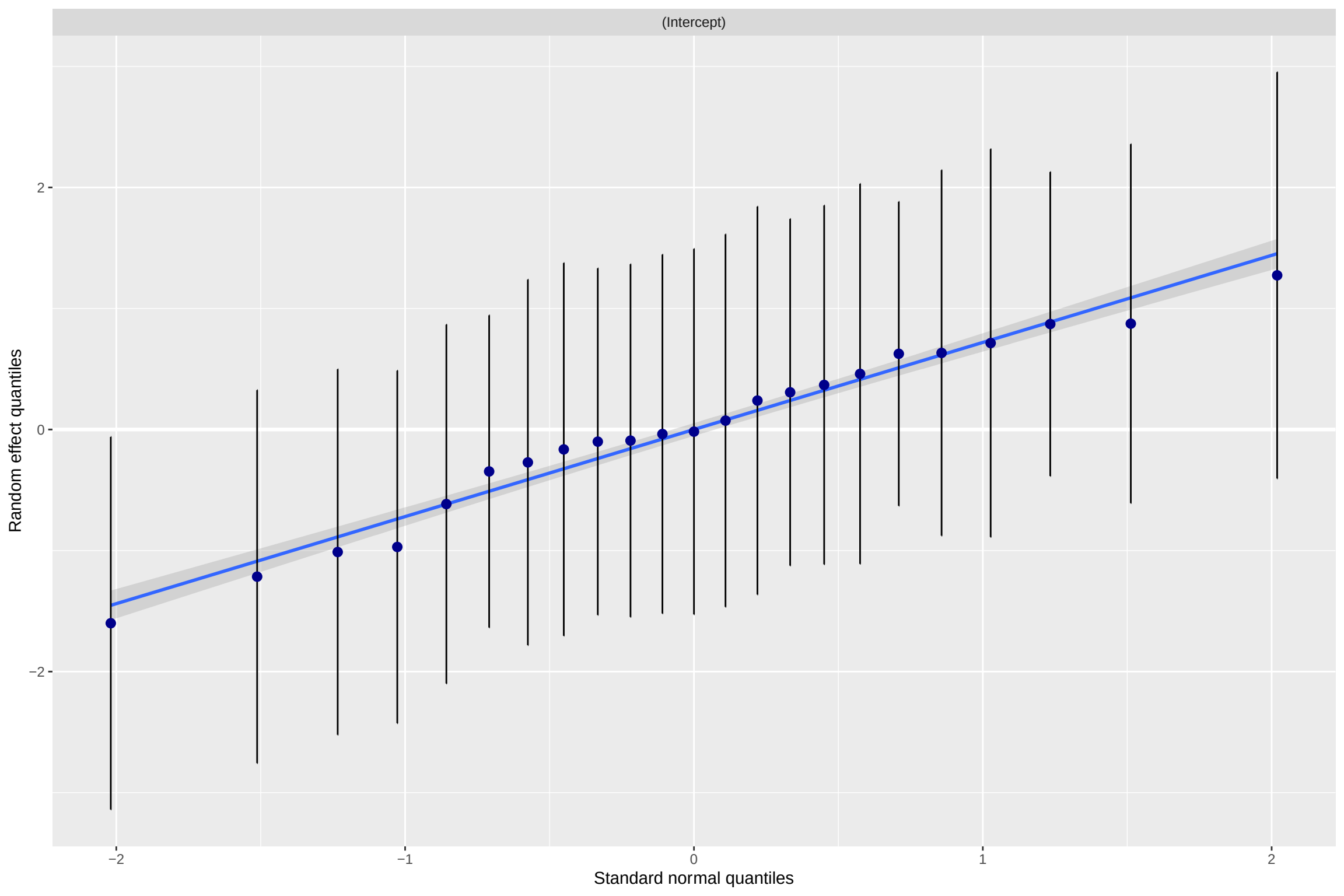
```
Backward reduced random-effect table:

               Eliminated npar  logLik    AIC    LRT Df Pr(>Chisq)
<none>                       8 -864.67 1745.3
(1 | TrapID)            0    7 -865.87 1745.7 2.4108  1    0.12050
(1 | Date_YMD)          0    7 -866.29 1746.6 3.2492  1    0.07146 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Backward reduced fixed-effect table:
Degrees of freedom method: Satterthwaite

                         Eliminated Sum Sq Mean Sq NumDF   DenDF F value
Exp_or_Cont                       1   0.06    0.06     1  29.248  0.0042
design                            2  46.57   46.57     1 104.972  3.0641
location_exposure                 3  41.14   41.14     1 106.646  2.6850
log_days_since_last_haul          0 382.10  382.10     1  20.651 24.9495
                            Pr(>F)
Exp_or_Cont                0.94895
design                     0.08296 .
location_exposure          0.10425
log_days_since_last_haul 6.356e-05 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Model found:
mean_length_cm ~ log_days_since_last_haul + (1 | TrapID) + (1 |
    Date_YMD)
```

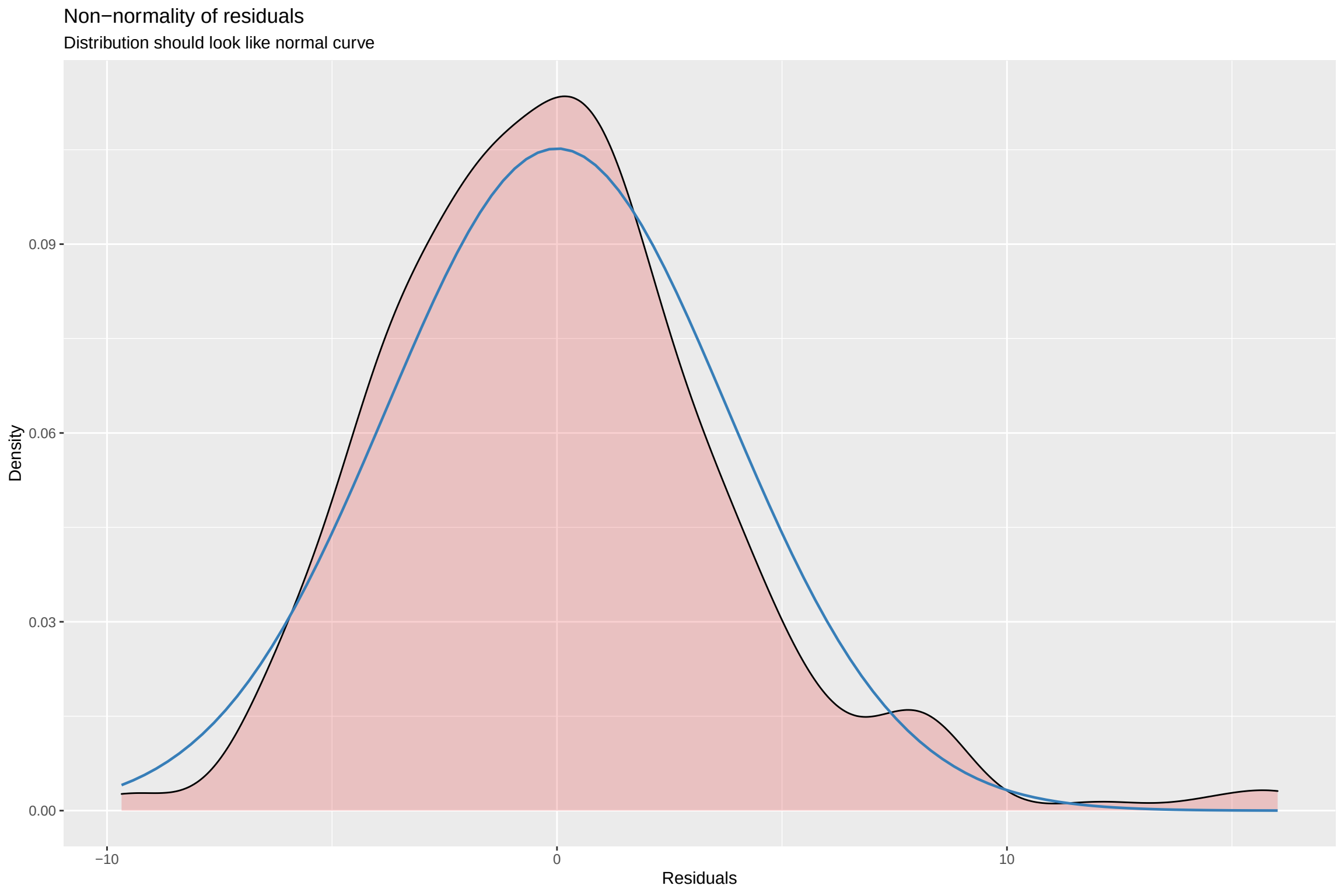
Optimal model found using 'step' function which performs backward elimination of fixed−effect terms

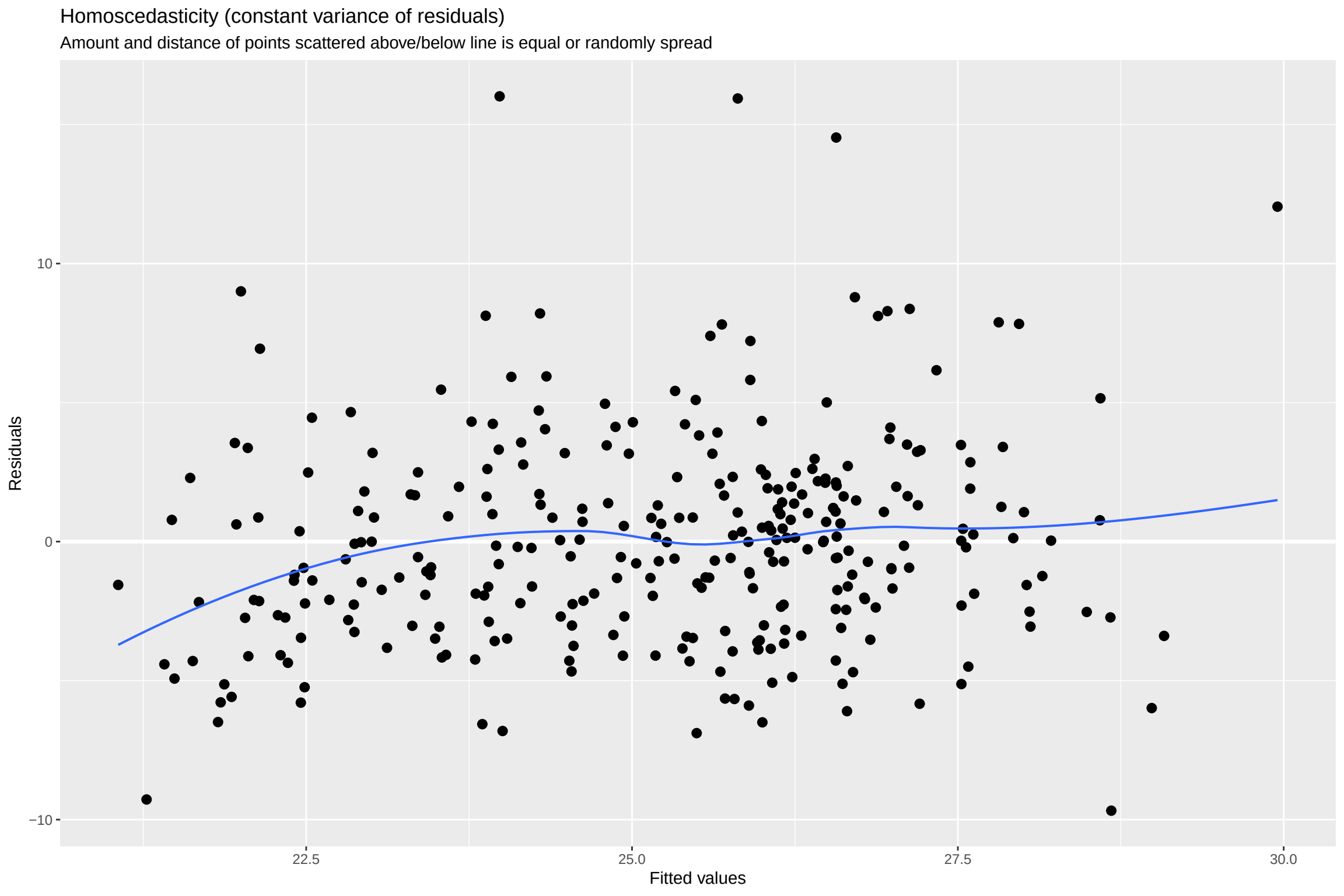
```
Linear mixed model fit by maximum likelihood . t−tests use
  Satterthwaite's method [lmerModLmerTest]
Formula: mean_length_cm ~ log_days_since_last_haul + (1 | TrapID) + (1 |
    Date_YMD)
   Data: trap_haul_no_zero

     AIC      BIC   logLik deviance df.resid
  1744.9   1763.6   −867.5   1734.9      302

Scaled residuals:
    Min      1Q  Median      3Q     Max
−2.4728 −0.6452 −0.0381  0.5038  4.0926

Random effects:
 Groups   Name        Variance Std.Dev.
 TrapID   (Intercept)  0.7159  0.8461
 Date_YMD (Intercept)  1.0804  1.0394
 Residual             15.3150  3.9134
Number of obs: 307, groups:  TrapID, 37; Date_YMD, 23

Fixed effects:
                         Estimate Std. Error      df t value Pr(>|t|)
(Intercept)               19.3115     1.2187 22.3752  15.846 1.19e−13 ***
log_days_since_last_haul   2.5805     0.5166 20.6510   4.995 6.36e−05 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Correlation of Fixed Effects:
            (Intr)
lg_dys_sn__ −0.956
```


Non−normality of residuals and outliers
Dots should be plotted along the line
Residuals
10
0
−10
22.5
25.0
27.5
30.0
Theoretical quantiles (predicted values)


(Intercept)
Random effect quantiles
Standard normal quantiles
3
2
1
0
−1
−2
−2
−1
0
1
2


(Intercept)
Random effect quantiles
2
0
−2
−2
−1
0
1
2
Standard normal quantiles


Non−normality of residuals
Distribution should look like normal curve
Density
0.09
0.06
0.03
0.00
−10
0
10
Residuals


Homoscedasticity (constant variance of residuals)
Amount and distance of points scattered above/below line is equal or randomly spread
Residuals
10
0
−10
22.5
25.0
27.5
30.0
Fitted values

Model summaries for all models with delta AIC < 2

```
$‘design + location_exposure + log_days_since_last_haul‘
Linear mixed model fit by maximum likelihood . t-tests use
  Satterthwaite's method [lmerModLmerTest]
Formula:
mean_length_cm ~ design + location_exposure + log_days_since_last_haul +
    (1 | TrapID) + (1 | Date_YMD)
   Data: trap_haul_no_zero

     AIC      BIC   logLik deviance df.resid
  1743.3   1769.4   -864.7   1729.3      300

Scaled residuals:
    Min      1Q  Median      3Q     Max
-2.5119 -0.6380 -0.0195  0.4568  4.1615

Random effects:
 Groups   Name        Variance Std.Dev.
 TrapID   (Intercept)  0.6457  0.8036
 Date_YMD (Intercept)  0.8422  0.9177
 Residual             15.1988  3.8986
Number of obs: 307, groups:  TrapID, 37; Date_YMD, 23

Fixed effects:
                            Estimate Std. Error       df t value Pr(>|t|)
(Intercept)                  17.3201     1.5711  57.5083  11.024 8.29e-16
designZ                       1.5656     0.8944 104.9719   1.750   0.0830
location_exposureWindward     2.6452     1.1135 143.6187   2.376   0.0188
log_days_since_last_haul      2.7994     0.5067  24.1538   5.525 1.08e-05

(Intercept)                 ***
designZ                     .
location_exposureWindward   *
log_days_since_last_haul    ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Correlation of Fixed Effects:
            (Intr) desgnZ lctn_W
designZ     -0.678
lctn_xpsrWn -0.459  0.627
lg_dys_sn__ -0.855  0.268  0.142

$‘location_exposure + log_days_since_last_haul‘
Linear mixed model fit by maximum likelihood . t-tests use
  Satterthwaite's method [lmerModLmerTest]
Formula: mean_length_cm ~ location_exposure + log_days_since_last_haul +
    (1 | TrapID) + (1 | Date_YMD)
   Data: trap_haul_no_zero

     AIC      BIC   logLik deviance df.resid
  1744.4   1766.7   -866.2   1732.4      301

Scaled residuals:
    Min      1Q  Median      3Q     Max
-2.4453 -0.6286 -0.0413  0.4457  4.1318

Random effects:
 Groups   Name        Variance Std.Dev.
 TrapID   (Intercept)  0.7102  0.8427
 Date_YMD (Intercept)  0.8339  0.9132
 Residual             15.3208  3.9142
Number of obs: 307, groups:  TrapID, 37; Date_YMD, 23

Fixed effects:
                            Estimate Std. Error       df t value Pr(>|t|)
(Intercept)                  19.1684     1.1573  22.6016  16.562 3.94e-14
location_exposureWindward     1.4344     0.8754 106.6460   1.639    0.104
log_days_since_last_haul      2.5674     0.4888  20.9287   5.253 3.34e-05

(Intercept)                 ***
location_exposureWindward
log_days_since_last_haul    ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Correlation of Fixed Effects:
            (Intr) lctn_W
lctn_xpsrWn -0.060
lg_dys_sn__ -0.951 -0.034

$log_days_since_last_haul
Linear mixed model fit by maximum likelihood . t-tests use
  Satterthwaite's method [lmerModLmerTest]
Formula: mean_length_cm ~ log_days_since_last_haul + (1 | TrapID) + (1 |
    Date_YMD)
   Data: trap_haul_no_zero

     AIC      BIC   logLik deviance df.resid
  1744.9   1763.6   -867.5   1734.9      302

Scaled residuals:
    Min      1Q  Median      3Q     Max
-2.4728 -0.6452 -0.0381  0.5038  4.0926

Random effects:
 Groups   Name        Variance Std.Dev.
 TrapID   (Intercept)  0.7159  0.8461
 Date_YMD (Intercept)  1.0804  1.0394
 Residual             15.3150  3.9134
Number of obs: 307, groups:  TrapID, 37; Date_YMD, 23

Fixed effects:
```

Full model summary

```
Linear mixed model fit by maximum likelihood . t-tests use
  Satterthwaite's method [lmerModLmerTest]
Formula:
mean_length_cm ~ design + log_days_since_last_haul + location_exposure +
    Exp_or_Cont + (1 | TrapID) + (1 | Date_YMD)
   Data: trap_haul_no_zero

     AIC      BIC   logLik deviance df.resid
  1745.3   1775.1   -864.7   1729.3      299

Scaled residuals:
    Min      1Q  Median      3Q     Max
-2.5093 -0.6407 -0.0172  0.4540  4.1641

Random effects:
 Groups   Name        Variance Std.Dev.
 TrapID   (Intercept)  0.6449  0.8031
 Date_YMD (Intercept)  0.8423  0.9178
 Residual             15.1991  3.8986
Number of obs: 307, groups:  TrapID, 37; Date_YMD, 23

Fixed effects:
                            Estimate Std. Error        df t value Pr(>|t|)
(Intercept)                 17.33813    1.59526  60.04292  10.869 8.23e-16
designZ                      1.56650    0.89442 104.73066   1.751   0.0828
log_days_since_last_haul     2.79948    0.50669  24.14727   5.525 1.08e-05
location_exposureWindward    2.64490    1.11338 143.56891   2.376   0.0188
Exp_or_ContExperimental     -0.03564    0.55192  29.24786  -0.065   0.9489

(Intercept)                 ***
designZ                      .
log_days_since_last_haul    ***
location_exposureWindward   *
Exp_or_ContExperimental
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Correlation of Fixed Effects:
            (Intr) desgnZ lg____ lctn_W
designZ     -0.665
lg_dys_sn__ -0.841  0.268
lctn_xpsrWn -0.452  0.627  0.142
Exp_r_CntEx -0.173 -0.017 -0.005  0.002
```