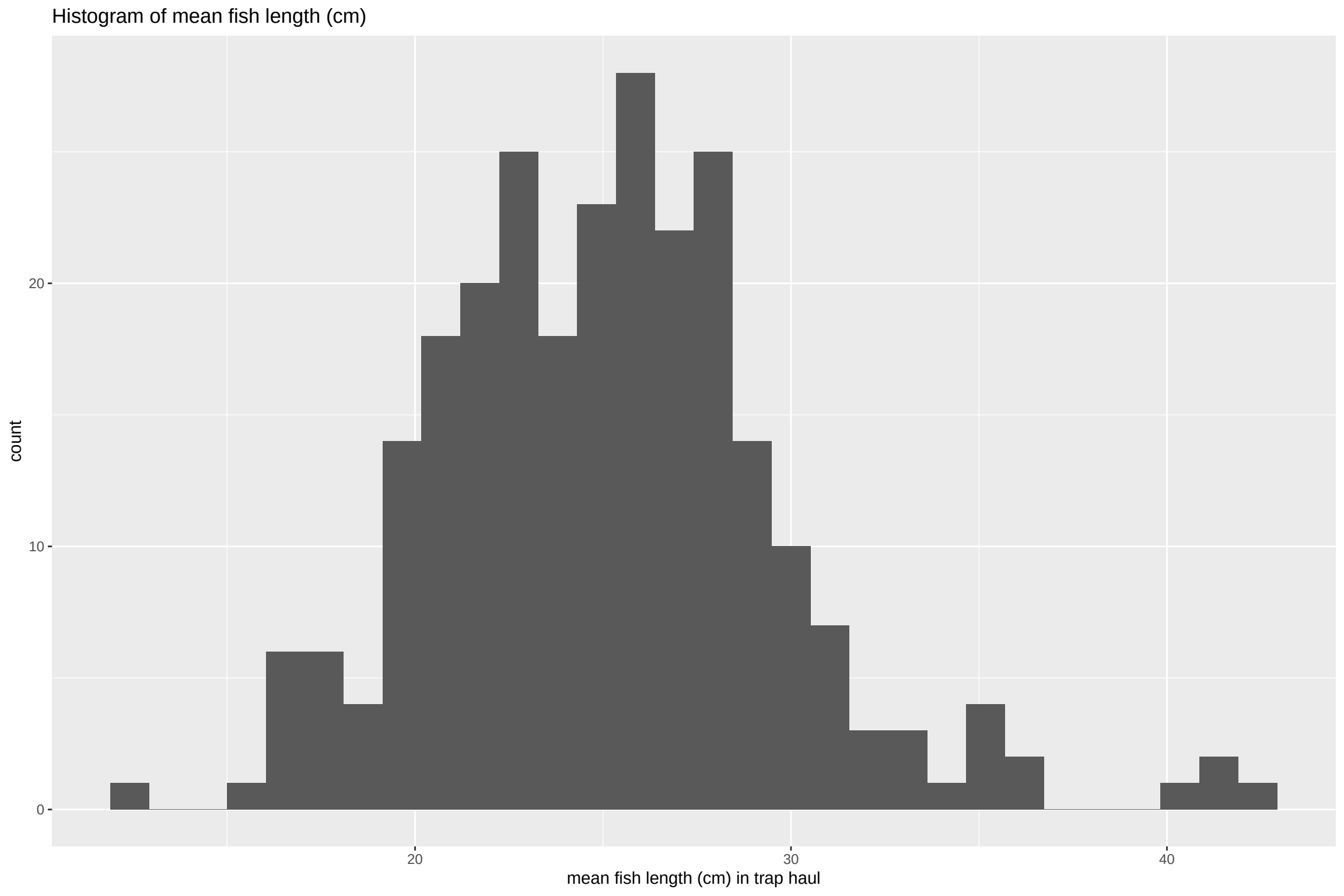
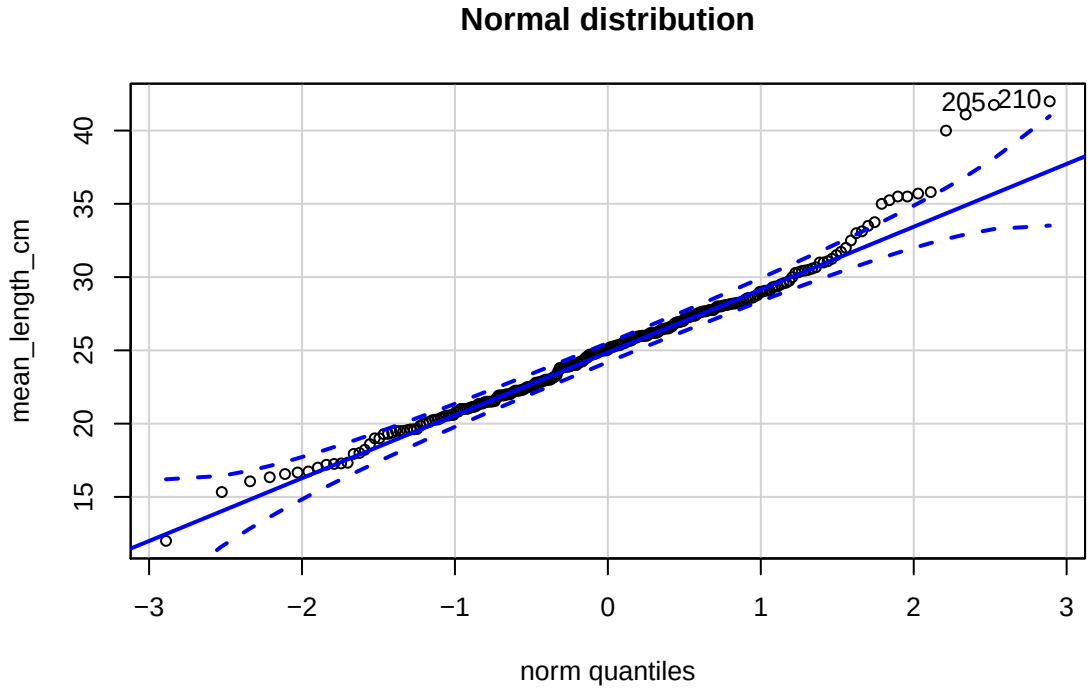
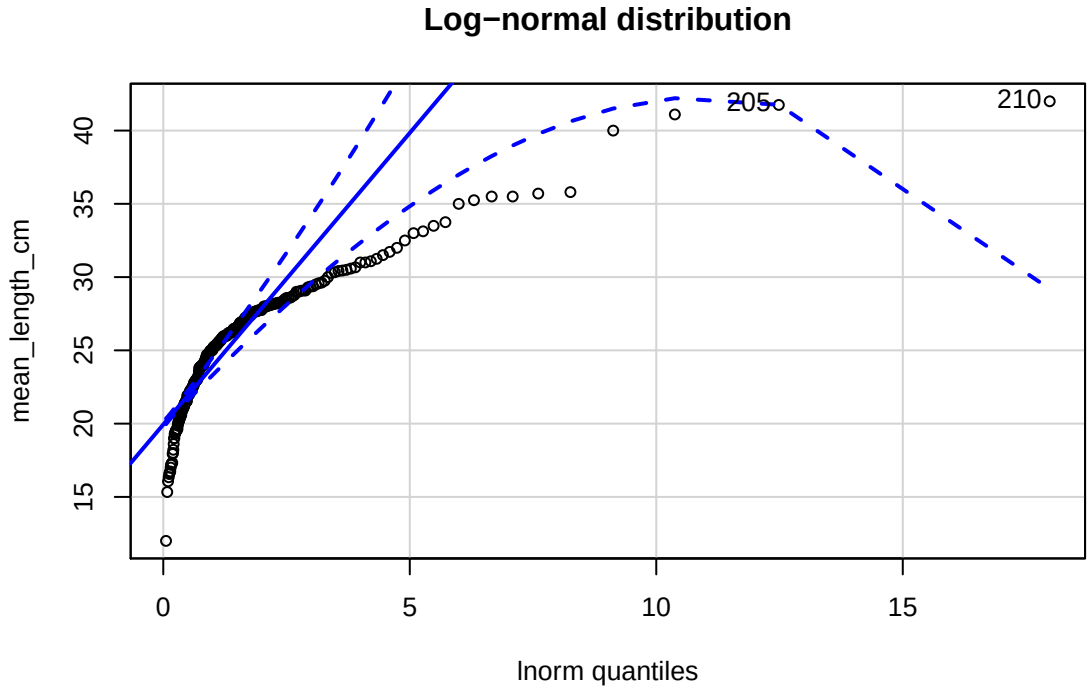
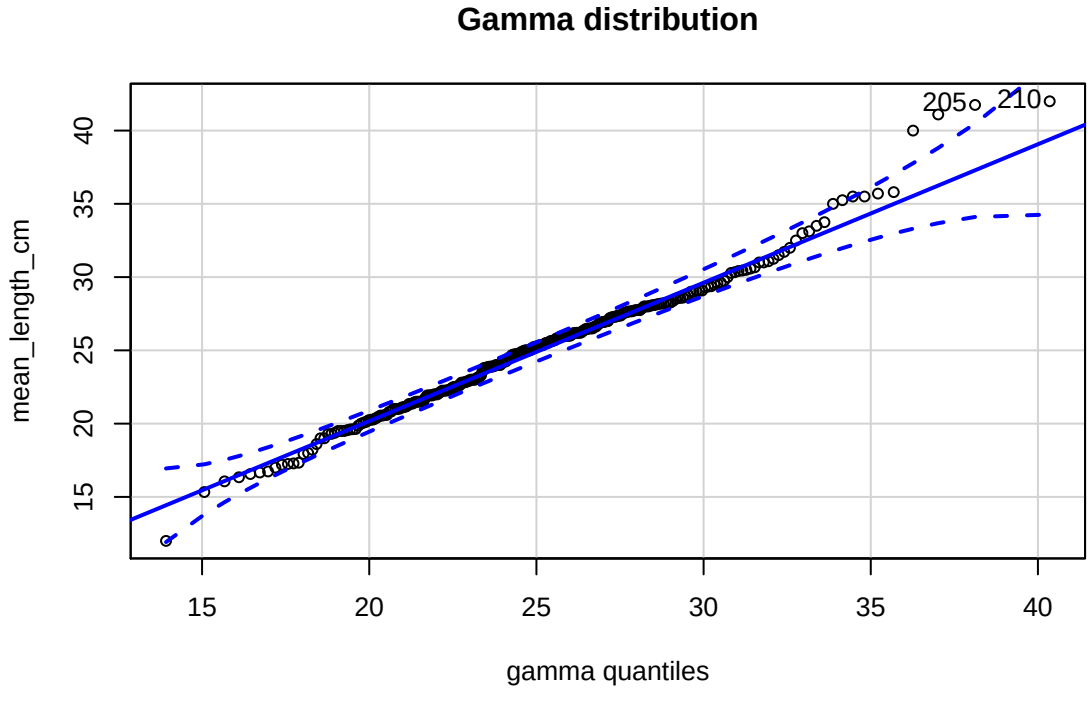

Histogram of mean fish length (cm)
count
0
10
20
20
30
40
mean fish length (cm) in trap haul

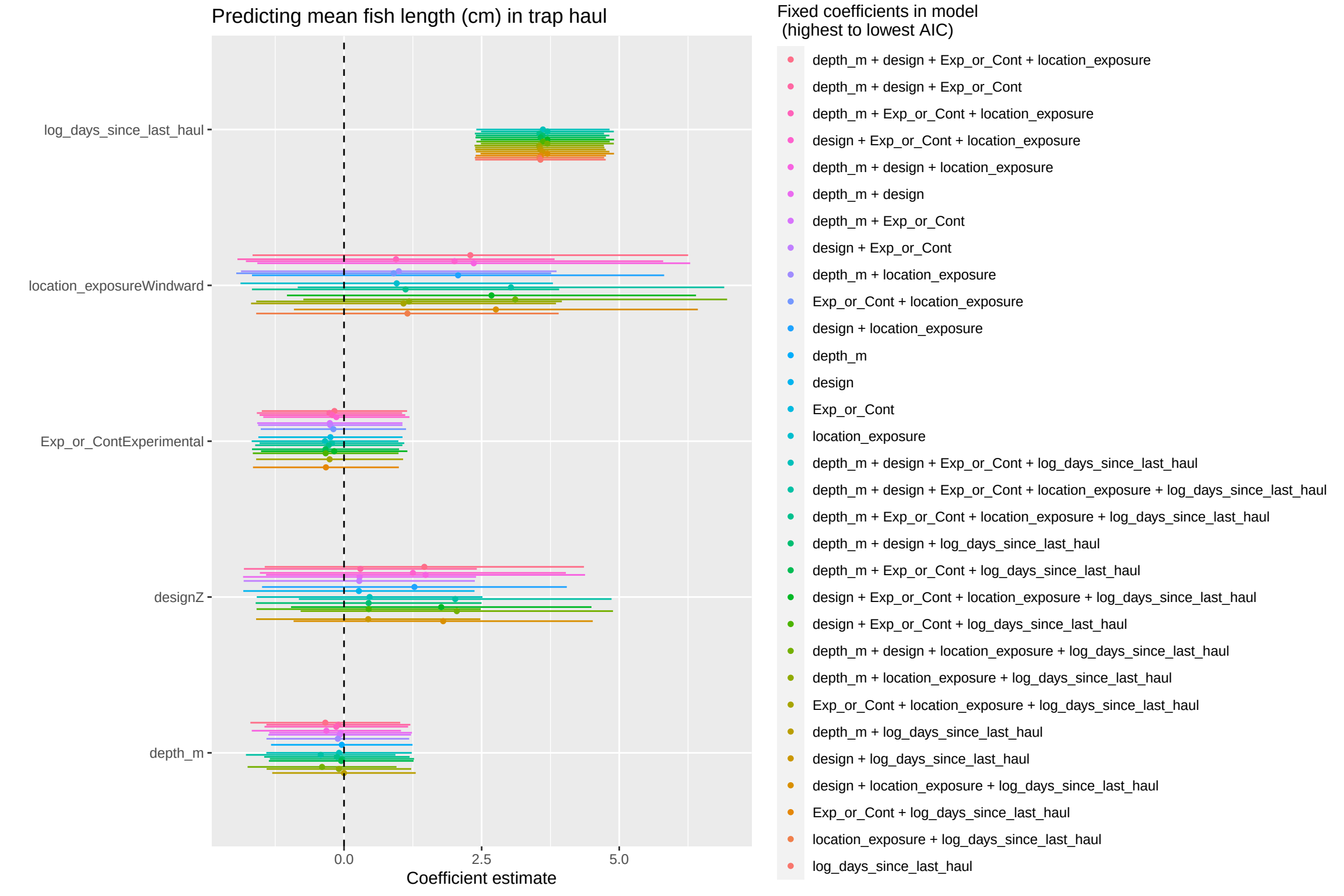

Normal distribution
mean_length_cm
norm quantiles
205
210


Log−normal distribution
mean_length_cm
lnorm quantiles
205
210


Gamma distribution
mean_length_cm
gamma quantiles
205
210

```
Global model call: lmer(formula = mean_length_cm ~ design + log_days_since_last_haul +
    location_exposure + Exp_or_Cont + depth_m + (1 | TrapID) +
    (1 | Date_YMD), data = trap_haul_no_zero_depth, REML = FALSE,
    na.action = "na.fail")
---
Model selection table
   (Int)      dpt_m dsg Exp_or_Cnt lct_exp log_dys_snc_lst_hal df   logLik   AICc delta weight
17 18.54                                                 2.943  5 -739.789 1489.8  0.00  0.235
25 18.50                                       +         2.929  6 -739.454 1491.2  1.43  0.115
21 18.70                           +                     2.949  6 -739.671 1491.7  1.86  0.093
27 16.57              +            +                     3.046  7 -738.620 1491.7  1.87  0.092
19 18.08              +                                  2.976  6 -739.701 1491.7  1.92  0.090
18 18.54 -6.475e-05                                      2.943  6 -739.789 1491.9  2.10  0.082
29 18.63                           +       +             2.933  7 -739.381 1493.2  3.39  0.043
26 18.66 -4.191e-03                        +             2.925  7 -739.445 1493.3  3.52  0.040
28 16.97 -1.798e-02   +                    +             3.047  8 -738.457 1493.5  3.67  0.037
23 18.24              +            +                     2.982  7 -739.579 1493.6  3.79  0.035
31 16.69              +            +       +             3.047  8 -738.585 1493.7  3.93  0.033
22 18.79 -2.337e-03                +                     2.947  7 -739.668 1493.8  3.97  0.032
20 18.14 -1.694e-03   +                                  2.976  7 -739.700 1493.8  4.03  0.031
30 18.86 -5.848e-03                +       +             2.928  8 -739.363 1495.3  5.49  0.015
32 17.15 -1.907e-02   +            +       +             3.048  9 -738.404 1495.5  5.71  0.013
24 18.38 -4.083e-03   +            +                     2.981  8 -739.571 1495.7  5.90  0.012
1  25.08                                                        4 -749.414 1507.0 17.17  0.000
9  25.01                                       +                5 -749.197 1508.6 18.82  0.000
5  25.21                           +                           5 -749.345 1508.9 19.11  0.000
3  24.84              +                                        5 -749.383 1509.0 19.19  0.000
2  25.14 -1.839e-03                                           5 -749.412 1509.1 19.25  0.000
11 23.82              +            +                        6 -748.798 1509.9 20.11  0.000
13 25.12                           +       +                6 -749.156 1510.6 20.83  0.000
10 25.19 -5.085e-03                        +                6 -749.183 1510.7 20.88  0.000
7  24.97              +            +                        6 -749.313 1511.0 21.14  0.000
6  25.34 -3.572e-03                +                        6 -749.338 1511.0 21.19  0.000
4  24.93 -2.789e-03   +                                     6 -749.379 1511.1 21.28  0.000
12 24.14 -1.443e-02   +                    +                7 -748.692 1511.8 22.01  0.000
15 23.93              +            +       +                7 -748.776 1512.0 22.18  0.000
14 25.35 -6.338e-03                +       +                7 -749.134 1512.7 22.90  0.000
8  25.12 -4.605e-03   +            +                        7 -749.302 1513.0 23.23  0.000
16 24.29 -1.531e-02   +            +       +                8 -748.659 1513.9 24.08  0.000
Models ranked by AICc(x)
Random terms (all models):
...1 | TrapID..., ...1 | Date_YMD...
```

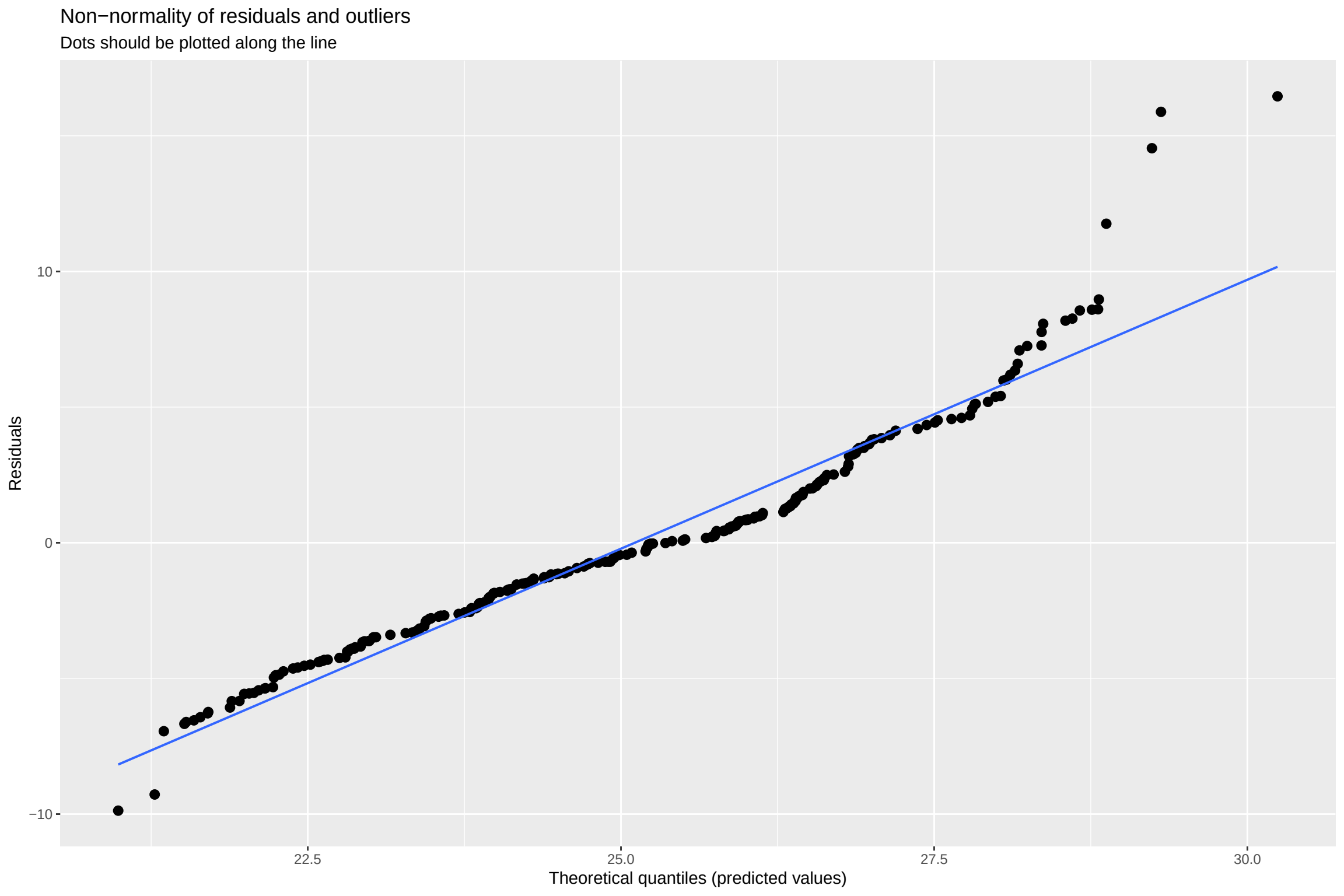
model	sigma	logLik	AIC	BIC	deviance	df.residual
log_days_since_last_haul	4.07	−739.79	1489.58	1507.36	1479.58	254
location_exposure + log_days_since_last_haul	4.07	−739.45	1490.91	1512.25	1478.91	253
Exp_or_Cont + log_days_since_last_haul	4.07	−739.67	1491.34	1512.68	1479.34	253
design + location_exposure + log_days_since_last_haul	4.05	−738.62	1491.24	1516.14	1477.24	252
design + log_days_since_last_haul	4.07	−739.70	1491.40	1512.74	1479.40	253
depth_m + log_days_since_last_haul	4.07	−739.79	1491.58	1512.92	1479.58	253
Exp_or_Cont + location_exposure + log_days_since_last_haul	4.07	−739.38	1492.76	1517.66	1478.76	252
depth_m + location_exposure + log_days_since_last_haul	4.07	−739.45	1492.89	1517.79	1478.89	252
depth_m + design + location_exposure + log_days_since_last_haul	4.05	−738.46	1492.91	1521.37	1476.91	251
design + Exp_or_Cont + log_days_since_last_haul	4.06	−739.58	1493.16	1518.06	1479.16	252
design + Exp_or_Cont + location_exposure + log_days_since_last_haul	4.05	−738.59	1493.17	1521.63	1477.17	251
depth_m + Exp_or_Cont + log_days_since_last_haul	4.07	−739.67	1493.34	1518.23	1479.34	252
depth_m + design + log_days_since_last_haul	4.07	−739.70	1493.40	1518.30	1479.40	252
depth_m + Exp_or_Cont + location_exposure + log_days_since_last_haul	4.07	−739.36	1494.73	1523.18	1478.73	251
depth_m + design + Exp_or_Cont + location_exposure + log_days_since_last_haul	4.05	−738.40	1494.81	1526.82	1476.81	250
depth_m + design + Exp_or_Cont + log_days_since_last_haul	4.07	−739.57	1495.14	1523.60	1479.14	251
none	4.06	−749.41	1506.83	1521.06	1498.83	255
location_exposure	4.06	−749.20	1508.39	1526.18	1498.39	254
Exp_or_Cont	4.06	−749.35	1508.69	1526.47	1498.69	254
design	4.06	−749.38	1508.77	1526.55	1498.77	254
depth_m	4.06	−749.41	1508.82	1526.61	1498.82	254
design + location_exposure	4.04	−748.80	1509.60	1530.94	1497.60	253
Exp_or_Cont + location_exposure	4.06	−749.16	1510.31	1531.65	1498.31	253
depth_m + location_exposure	4.06	−749.18	1510.37	1531.71	1498.37	253
design + Exp_or_Cont	4.05	−749.31	1510.63	1531.97	1498.63	253
depth_m + Exp_or_Cont	4.06	−749.34	1510.68	1532.02	1498.68	253
depth_m + design	4.06	−749.38	1510.76	1532.10	1498.76	253
depth_m + design + location_exposure	4.05	−748.69	1511.38	1536.28	1497.38	252
design + Exp_or_Cont + location_exposure	4.04	−748.78	1511.55	1536.45	1497.55	252
depth_m + Exp_or_Cont + location_exposure	4.06	−749.13	1512.27	1537.17	1498.27	252
depth_m + design + Exp_or_Cont	4.06	−749.30	1512.60	1537.50	1498.60	252
depth_m + design + Exp_or_Cont + location_exposure	4.05	−748.66	1513.32	1541.77	1497.32	251

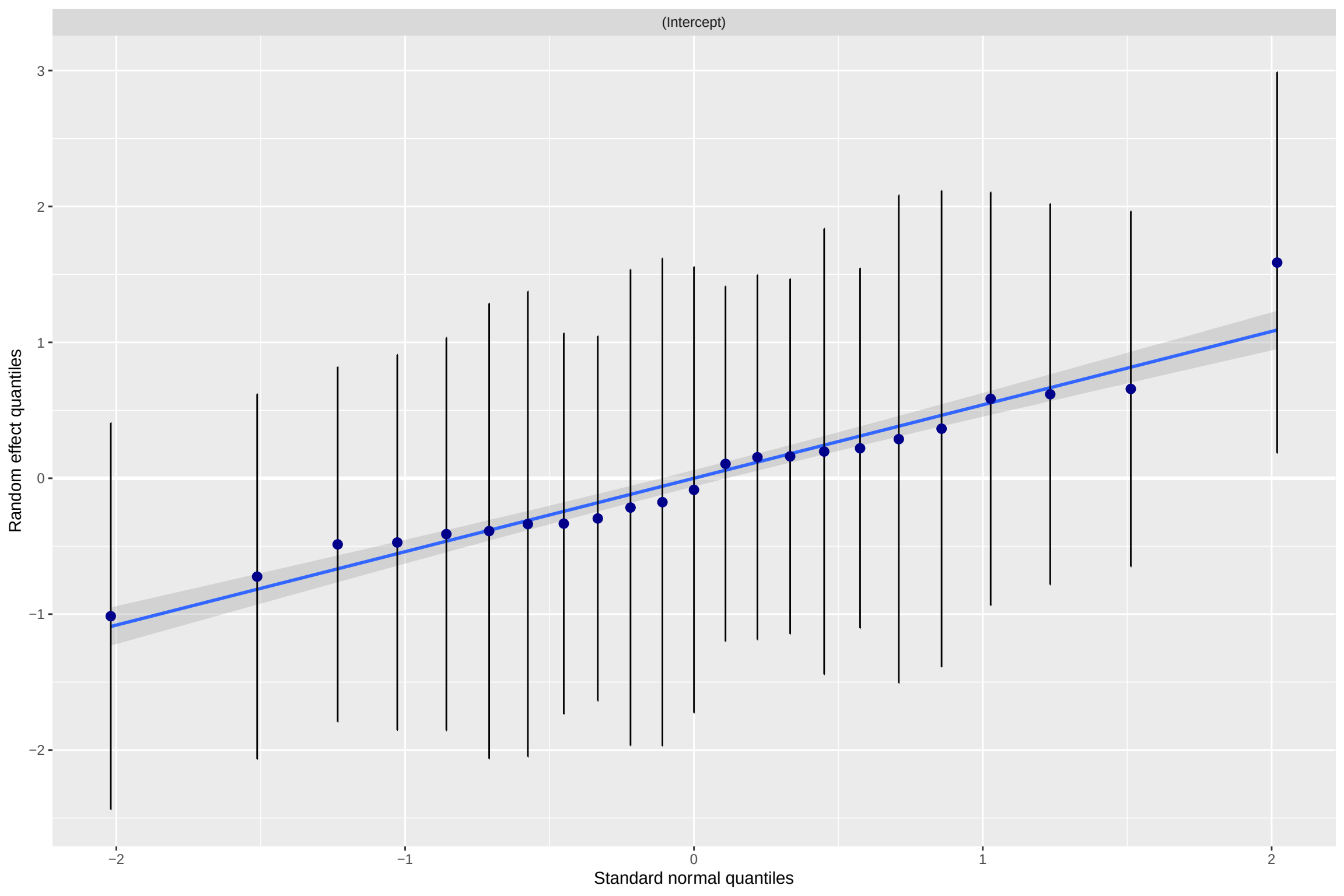

Predicting mean fish length (cm) in trap haul
log_days_since_last_haul
location_exposureWindward
Exp_or_ContExperimental
designZ
depth_m
0.0
2.5
5.0
Coefficient estimate
Fixed coefficients in model
(highest to lowest AIC)
depth_m + design + Exp_or_Cont + location_exposure
depth_m + design + Exp_or_Cont
depth_m + Exp_or_Cont + location_exposure
design + Exp_or_Cont + location_exposure
depth_m + design + location_exposure
depth_m + design
depth_m + Exp_or_Cont
design + Exp_or_Cont
depth_m + location_exposure
Exp_or_Cont + location_exposure
design + location_exposure
depth_m
design
Exp_or_Cont
location_exposure
depth_m + design + Exp_or_Cont + log_days_since_last_haul
depth_m + design + Exp_or_Cont + location_exposure + log_days_since_last_haul
depth_m + Exp_or_Cont + location_exposure + log_days_since_last_haul
depth_m + design + log_days_since_last_haul
depth_m + Exp_or_Cont + log_days_since_last_haul
design + Exp_or_Cont + location_exposure + log_days_since_last_haul
design + Exp_or_Cont + log_days_since_last_haul
depth_m + design + location_exposure + log_days_since_last_haul
depth_m + location_exposure + log_days_since_last_haul
Exp_or_Cont + location_exposure + log_days_since_last_haul
depth_m + log_days_since_last_haul
design + log_days_since_last_haul
design + location_exposure + log_days_since_last_haul
Exp_or_Cont + log_days_since_last_haul
location_exposure + log_days_since_last_haul
log_days_since_last_haul

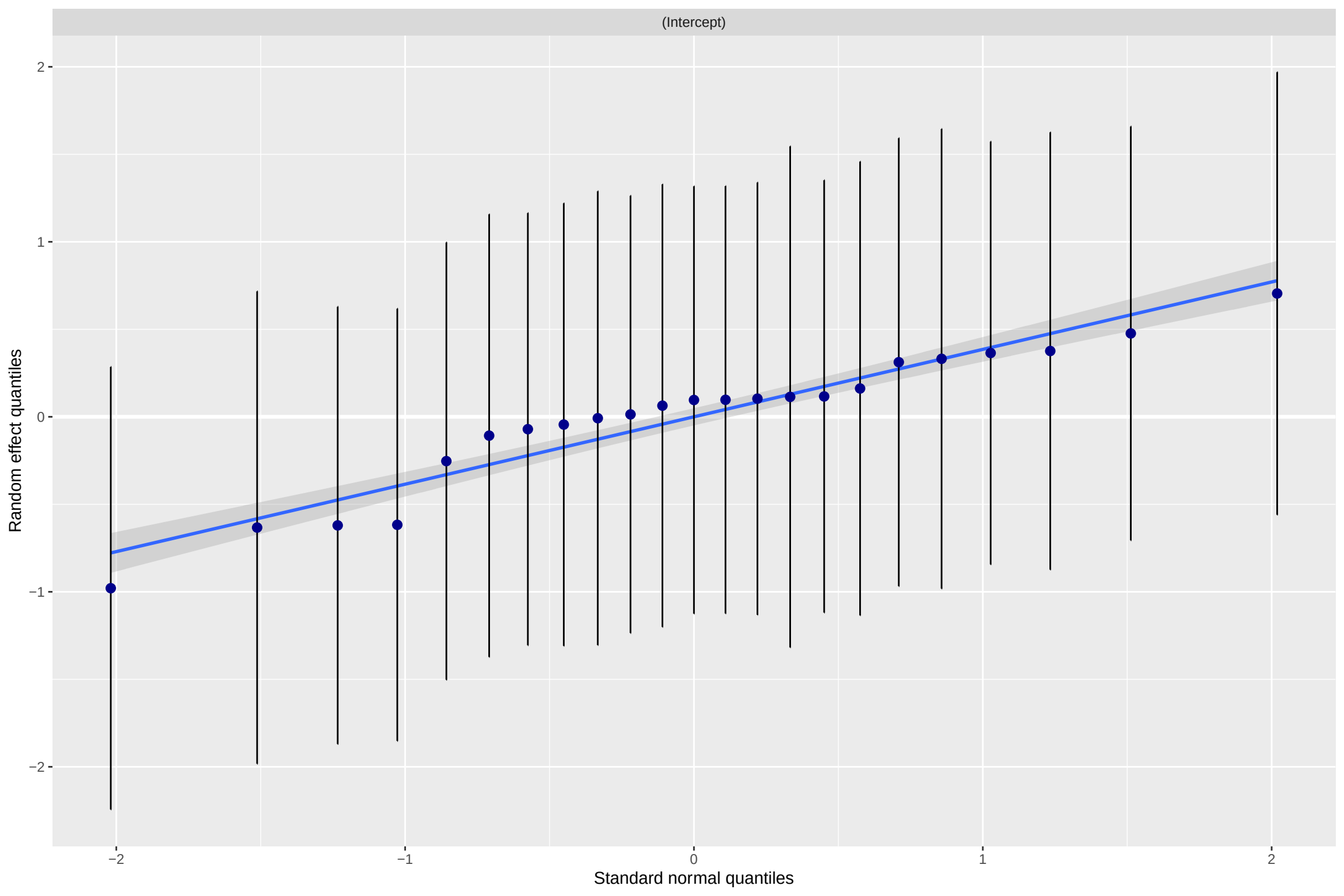
```
Backward reduced random-effect table:

               Eliminated npar  logLik    AIC    LRT Df Pr(>Chisq)
<none>                      9 -738.40 1494.8
(1 | TrapID)            0   8 -739.54 1495.1 2.2774  1     0.1313
(1 | Date_YMD)          0   8 -738.97 1493.9 1.1239  1     0.2891

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

                         Eliminated Sum Sq Mean Sq NumDF  DenDF F value    Pr(>F)
Exp_or_Cont                       1   1.76    1.76     1 16.928  0.1072    0.7473
depth_m                           2   5.52    5.52     1 16.709  0.3356    0.5701
design                            3  27.68   27.68     1 92.809  1.6869    0.1972
location_exposure                 4  11.17   11.17     1 95.400  0.6748    0.4134
log_days_since_last_haul          0 575.89  575.89     1 20.994 34.7593 7.498e-06 ***
---
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)
```

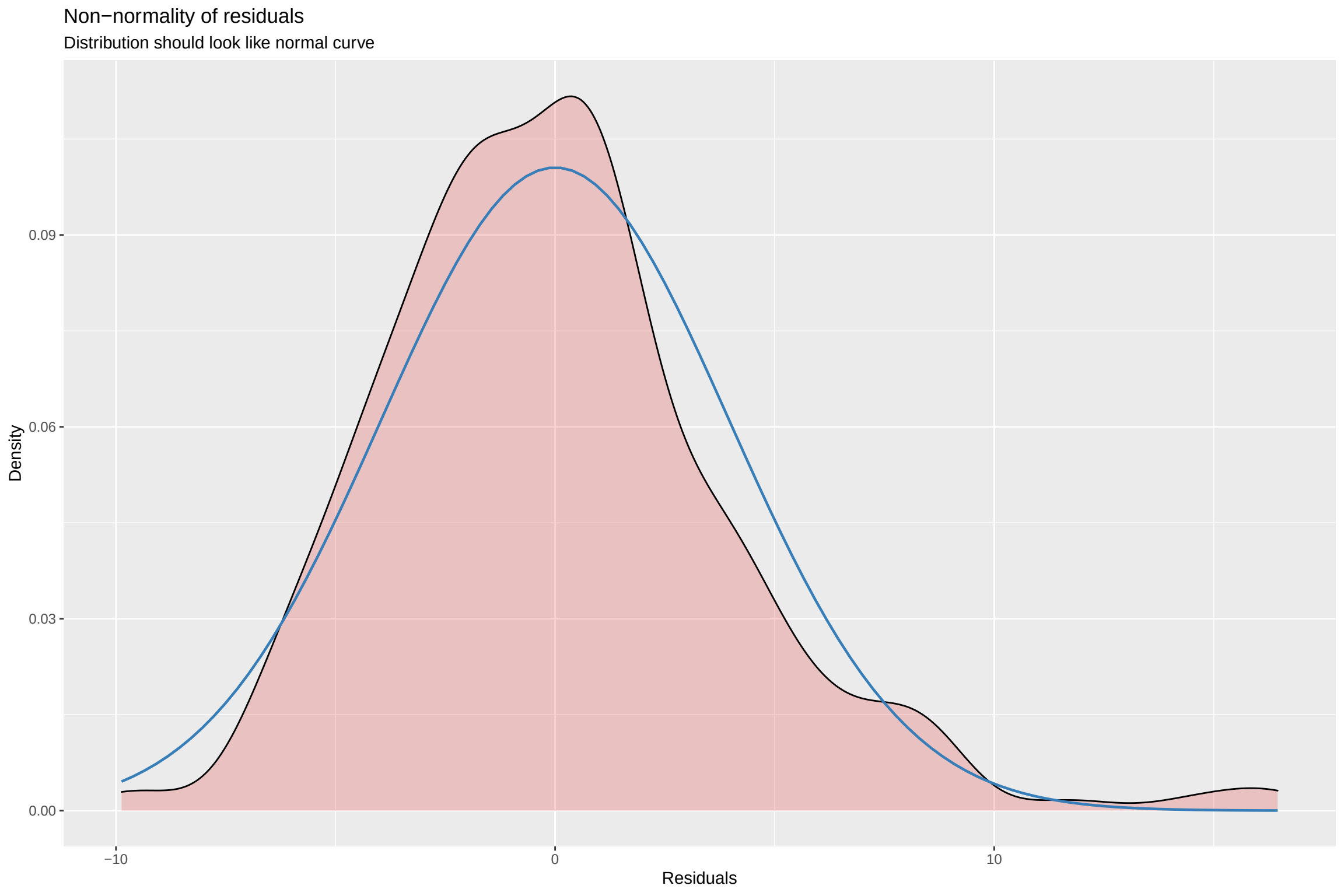
Optimal model found using 'step' function which performs backward elimination of fixed−effect terms

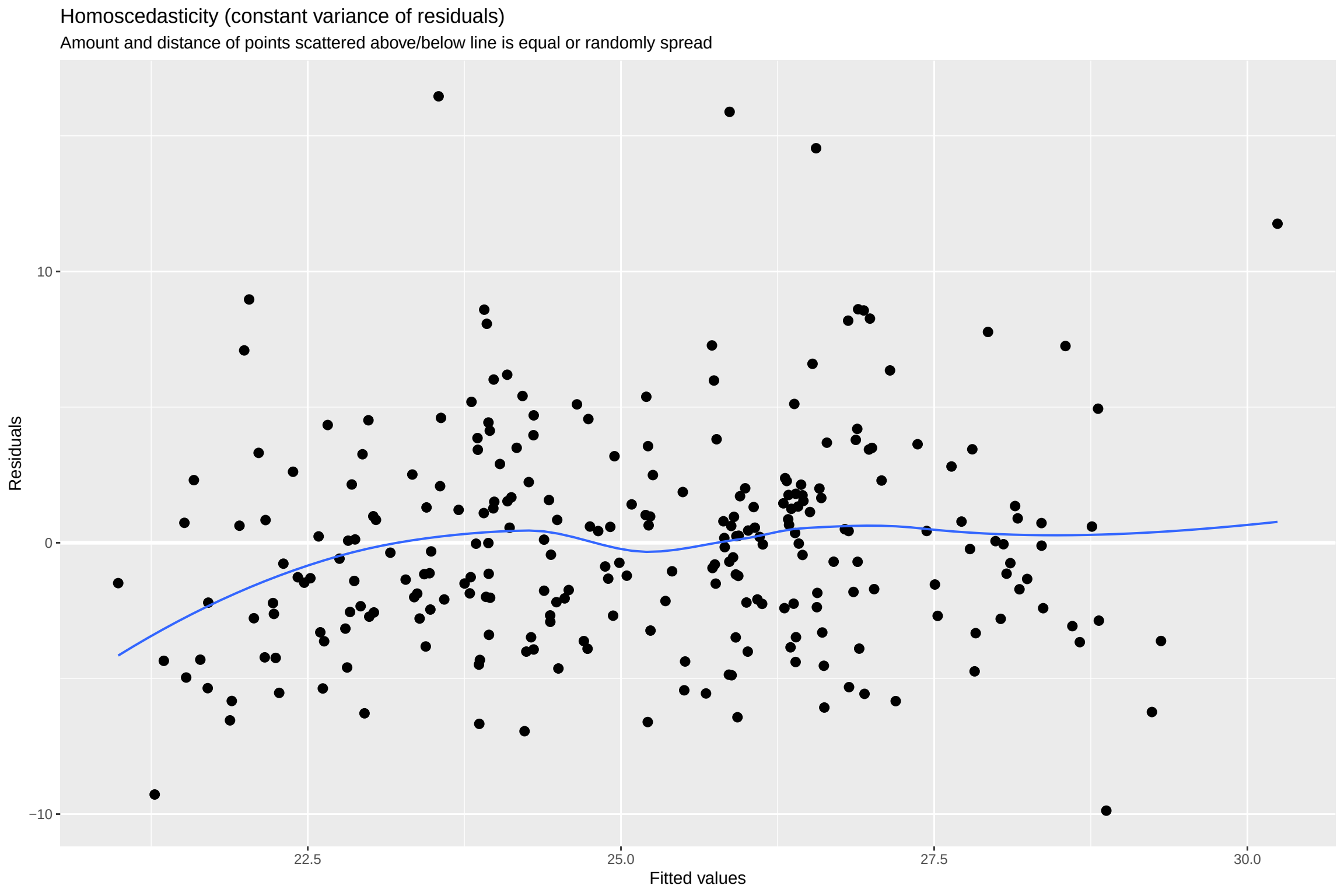
```
Linear mixed model fit by maximum likelihood . t−tests use Satterthwaite's method ['lmerModLmerTest']
Formula: mean_length_cm ~ log_days_since_last_haul + (1 | TrapID) + (1 |      Date_YMD)
   Data: trap_haul_no_zero_depth

     AIC      BIC   logLik deviance df.resid
  1489.6   1507.4   −739.8   1479.6      254

Scaled residuals:
    Min      1Q  Median      3Q     Max
−2.4258 −0.6376 −0.0397  0.4514  4.0427

Random effects:
 Groups   Name        Variance Std.Dev.
 TrapID   (Intercept)  0.8818  0.939
 Date_YMD (Intercept)  0.5685  0.754
 Residual             16.5680  4.070
Number of obs: 259, groups:  TrapID, 23; Date_YMD, 23

Fixed effects:
                         Estimate Std. Error      df t value Pr(>|t|)
(Intercept)               18.5387     1.1780 22.3521  15.738  1.4e−13 ***
log_days_since_last_haul   2.9433     0.4992 20.9939   5.896  7.5e−06 ***
---
Signif. codes:  0 ...***... 0.001 ...**... 0.01 ...*... 0.05 ..... 0.1 ... ... 1

Correlation of Fixed Effects:
            (Intr)
lg_dys_sn__ −0.948
```


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
Standard normal quantiles
2
1
0
−1
−2
−2
−1
0
1
2


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

```
$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_depth

     AIC      BIC   logLik deviance df.resid
  1489.6   1507.4   -739.8   1479.6      254

Scaled residuals:
    Min      1Q  Median      3Q     Max
-2.4258 -0.6376 -0.0397  0.4514  4.0427

Random effects:
 Groups   Name        Variance Std.Dev.
 TrapID   (Intercept)  0.0818  0.939
 Date_YMD (Intercept)  0.5685  0.754
 Residual             16.5680  4.070
Number of obs: 259, groups:  TrapID, 23; Date_YMD, 23

Fixed effects:
                    Estimate Std. Error      df t value Pr(>|t|)
(Intercept)          18.5387     1.1780 22.3521  15.738  1.4e-13 ***
log_days_since_last_haul   2.9433     0.4992 20.9939   5.896  7.5e-06 ***
---
Signif. codes:  0 ...***... 0.001 ...**... 0.01 ...*... 0.05 ..... 0.1 ... ... 1

Correlation of Fixed Effects:
            (Intr)
lg_dys_sn__ -0.948

$'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_depth

     AIC      BIC   logLik deviance df.resid
  1490.9   1512.2   -739.5   1478.9      253

Scaled residuals:
    Min      1Q  Median      3Q     Max
-2.4168 -0.6453 -0.0646  0.4685  4.0576

Random effects:
 Groups   Name        Variance Std.Dev.
 TrapID   (Intercept)  0.8808  0.9385
 Date_YMD (Intercept)  0.5264  0.7255
 Residual             16.5545  4.0687
Number of obs: 259, groups:  TrapID, 23; Date_YMD, 23

Fixed effects:
                     Estimate Std. Error      df t value Pr(>|t|)
(Intercept)           18.4998     1.1667 22.0827  15.857 1.49e-13 ***
location_exposureWindward   1.1517     1.4019 95.3999   0.821    0.413
log_days_since_last_haul    2.9286     0.4946 21.0804   5.922 6.95e-06 ***
---
Signif. codes:  0 ...***... 0.001 ...**... 0.01 ...*... 0.05 ..... 0.1 ... ... 1

Correlation of Fixed Effects:
            (Intr) lctn_W
lctn_xpsrWn -0.031
lg_dys_sn__ -0.945 -0.048

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

     AIC      BIC   logLik deviance df.resid
  1491.3   1512.7   -739.7   1479.3      253

Scaled residuals:
    Min      1Q  Median      3Q     Max
-2.4073 -0.6251 -0.0089  0.4677  4.0665

Random effects:
 Groups   Name        Variance Std.Dev.
 TrapID   (Intercept)  0.0824  0.9393
 Date_YMD (Intercept)  0.5617  0.7495
 Residual             16.5566  4.0690
Number of obs: 259, groups:  TrapID, 23; Date_YMD, 23

Fixed effects:
                    Estimate Std. Error      df t value Pr(>|t|)
(Intercept)          18.7024     1.2238 25.3512  15.282 2.66e-14 ***
Exp_or_ContExperimental  -0.3294     0.6760 17.1130  -0.487    0.632
log_days_since_last_haul   2.9485     0.4984 20.9834   5.916 7.17e-06 ***
---
Signif. codes:  0 ...***... 0.001 ...**... 0.01 ...*... 0.05 ..... 0.1 ... ... 1

Correlation of Fixed Effects:
            (Intr) Ex__CE
Exp_r_CntEx -0.277
lg_dys_sn__ -0.906 -0.018
```

```
$'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_depth

     AIC      BIC   logLik deviance df.resid
  1491.2   1516.1   -738.6   1477.2      252

Scaled residuals:
    Min      1Q  Median      3Q     Max
-2.4621 -0.6307 -0.0547  0.4853  4.0670

Random effects:
 Groups   Name        Variance Std.Dev.
 TrapID   (Intercept)  0.8546  0.9245
 Date_YMD (Intercept)  0.5945  0.7710
 Residual             16.4079  4.0507
Number of obs: 259, groups:  TrapID, 23; Date_YMD, 23

Fixed effects:
                     Estimate Std. Error      df t value Pr(>|t|)
(Intercept)           16.5661     1.9115  83.4618   8.667 2.91e-13 ***
designZ                1.8011     1.3867  92.8087   1.299    0.197
location_exposureWindward   2.7590     1.8722 109.8954   1.474    0.143
log_days_since_last_haul    3.0456     0.5103  22.9172   5.968 4.44e-06 ***
---
Signif. codes:  0 ...***... 0.001 ...**... 0.01 ...*... 0.05 ..... 0.1 ... ... 1

Correlation of Fixed Effects:
            (Intr) designZ lctn_W
designZ     -0.786
lctn_xpsrWn -0.538  0.667
lg_dys_sn__ -0.723  0.190  0.093

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

     AIC      BIC   logLik deviance df.resid
  1491.4   1512.7   -739.7   1479.4      253

Scaled residuals:
    Min      1Q  Median      3Q     Max
-2.4398 -0.6377 -0.0395  0.4813  4.0400

Random effects:
 Groups   Name        Variance Std.Dev.
 TrapID   (Intercept)  0.8778  0.9369
 Date_YMD (Intercept)  0.6017  0.7757
 Residual             16.5343  4.0662
Number of obs: 259, groups:  TrapID, 23; Date_YMD, 23

Fixed effects:
                    Estimate Std. Error      df t value Pr(>|t|)
(Intercept)          18.0811     1.6185 59.8033  11.172 2.86e-16 ***
designZ               0.4395     1.0395 80.9835   0.423    0.674
log_days_since_last_haul   2.9764     0.5104 22.1828   5.831 7.00e-06 ***
---
Signif. codes:  0 ...***... 0.001 ...**... 0.01 ...*... 0.05 ..... 0.1 ... ... 1

Correlation of Fixed Effects:
            (Intr) designZ
designZ     -0.680
lg_dys_sn__ -0.802  0.172
```

Full model summary

```
ır mixed model fit by maximum likelihood . t-tests use Satterthwaite's method ['lmerModLmerTest']
ıla: mean_length_cm ~ design + log_days_since_last_haul + location_exposure +      Exp_or_Cont + depth_m + (1 | TrapID) + (1 | Date_YMD)
ıta: trap_haul_no_zero_depth

 AIC      BIC   logLik deviance df.resid
)4.8   1526.8   -738.4   1476.8      250

)d residuals:
fin      1Q  Median      3Q     Max
)75 -0.6255 -0.0441  0.4720  4.0420

)m effects:
ups   Name        Variance Std.Dev.
)ID   (Intercept)  0.7812  0.8838
)_YMD (Intercept)  0.5722  0.7565
:dual            16.4394  4.0546
)r of obs: 259, groups:  TrapID, 23; Date_YMD, 23

d effects:
                      Estimate Std. Error       df t value Pr(>|t|)
)rcept)               17.14786    2.09057 76.61329   8.202 4.28e-12 ***
)nZ                    2.02024    1.44922 77.80487   1.394    0.167
days_since_last_haul   3.04803    0.50785 22.89672   6.002 4.11e-06 ***
:ion_exposureWindward  3.03299    1.97674 85.61311   1.534    0.129
)r_ContExperimental   -0.21956    0.67046 16.92793  -0.327    0.747
)_m                   -0.01907    0.03116 16.53784  -0.612    0.549

:f. codes:  0 ...***... 0.001 ...**... 0.01 ...*... 0.05 ..... 0.1 ... ... 1

)lation of Fixed Effects:
        (Intr) desgnZ lg____ lctn_W Ex__CE
)nZ     -0.598
/s_sn__ -0.655  0.184
_xpsrWn -0.391  0.700  0.089
'_CntEx -0.264  0.058 -0.007  0.119
)_m     -0.346 -0.298 -0.008 -0.302  0.104
```