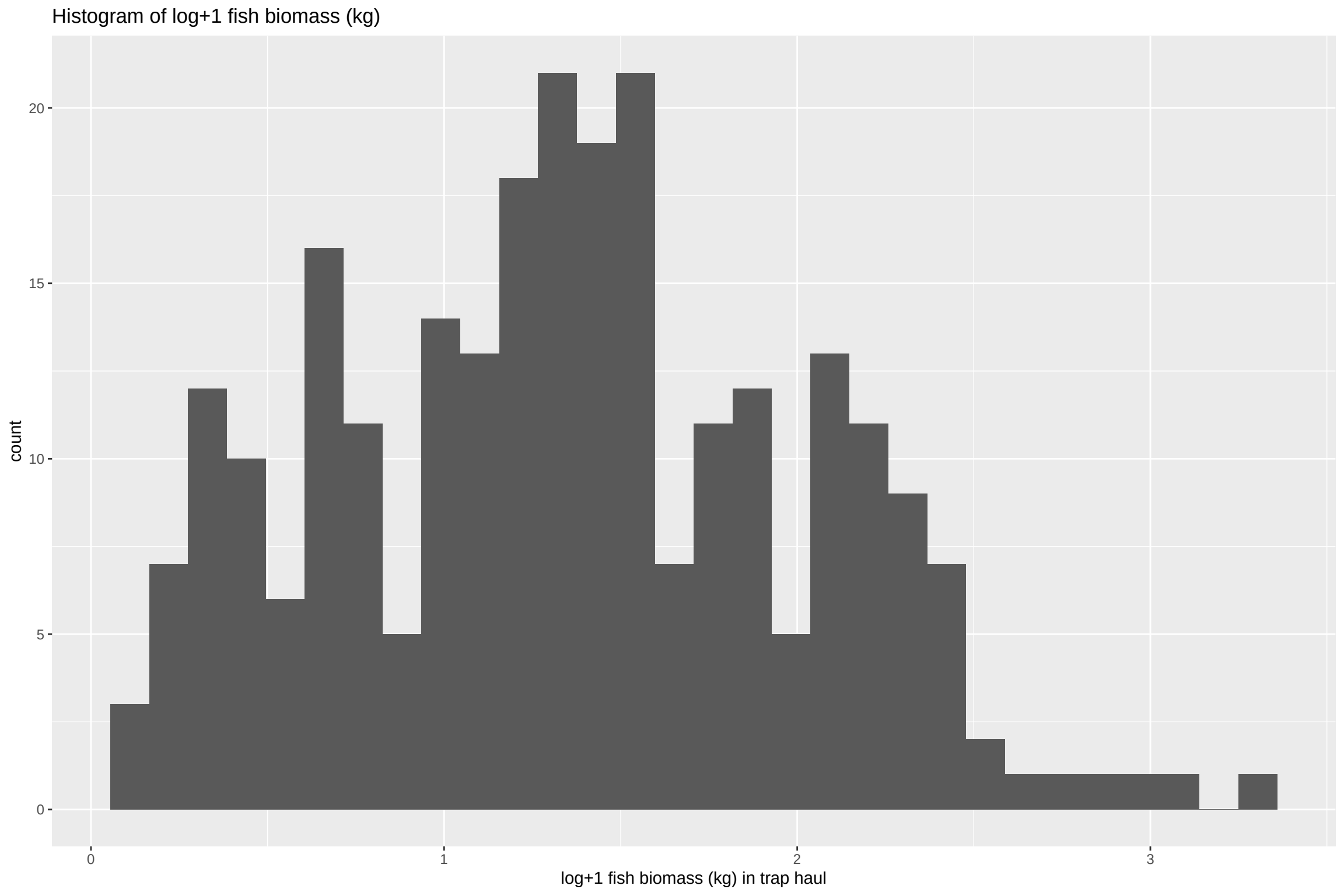
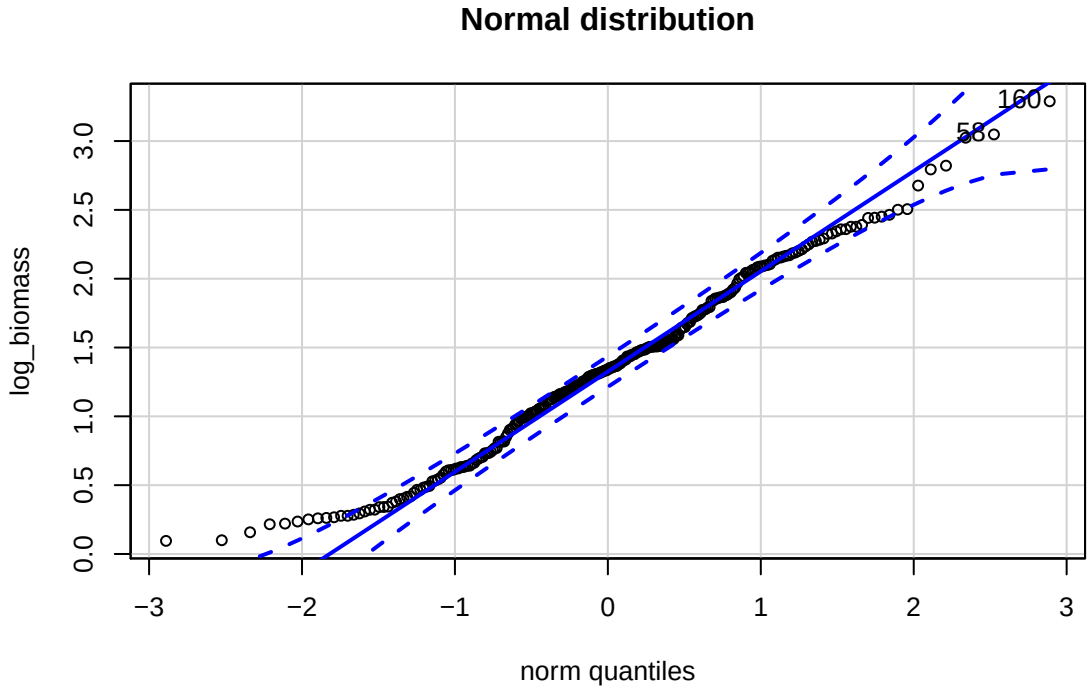
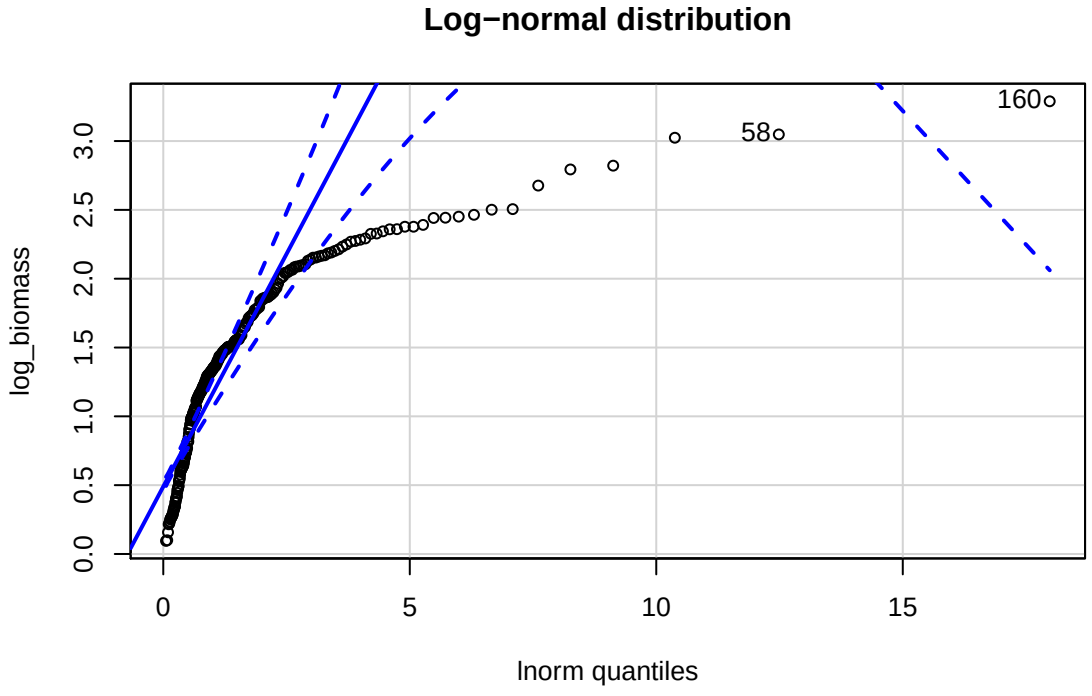
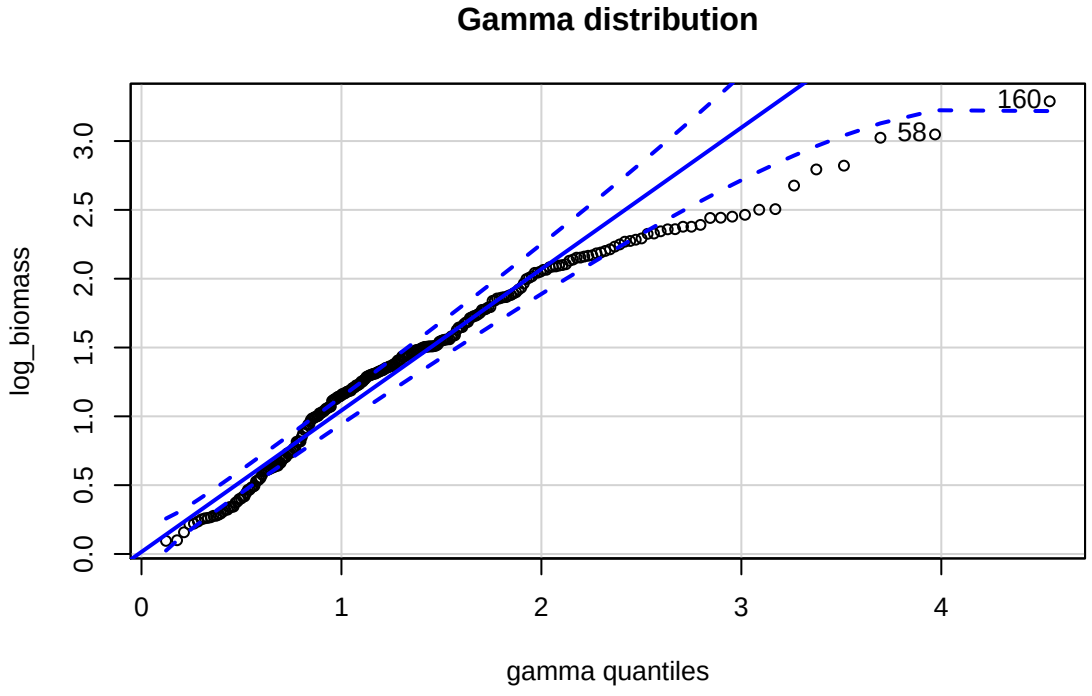

Histogram of log+1 fish biomass (kg)
count
0
5
10
15
20
0
1
2
3
log+1 fish biomass (kg) in trap haul

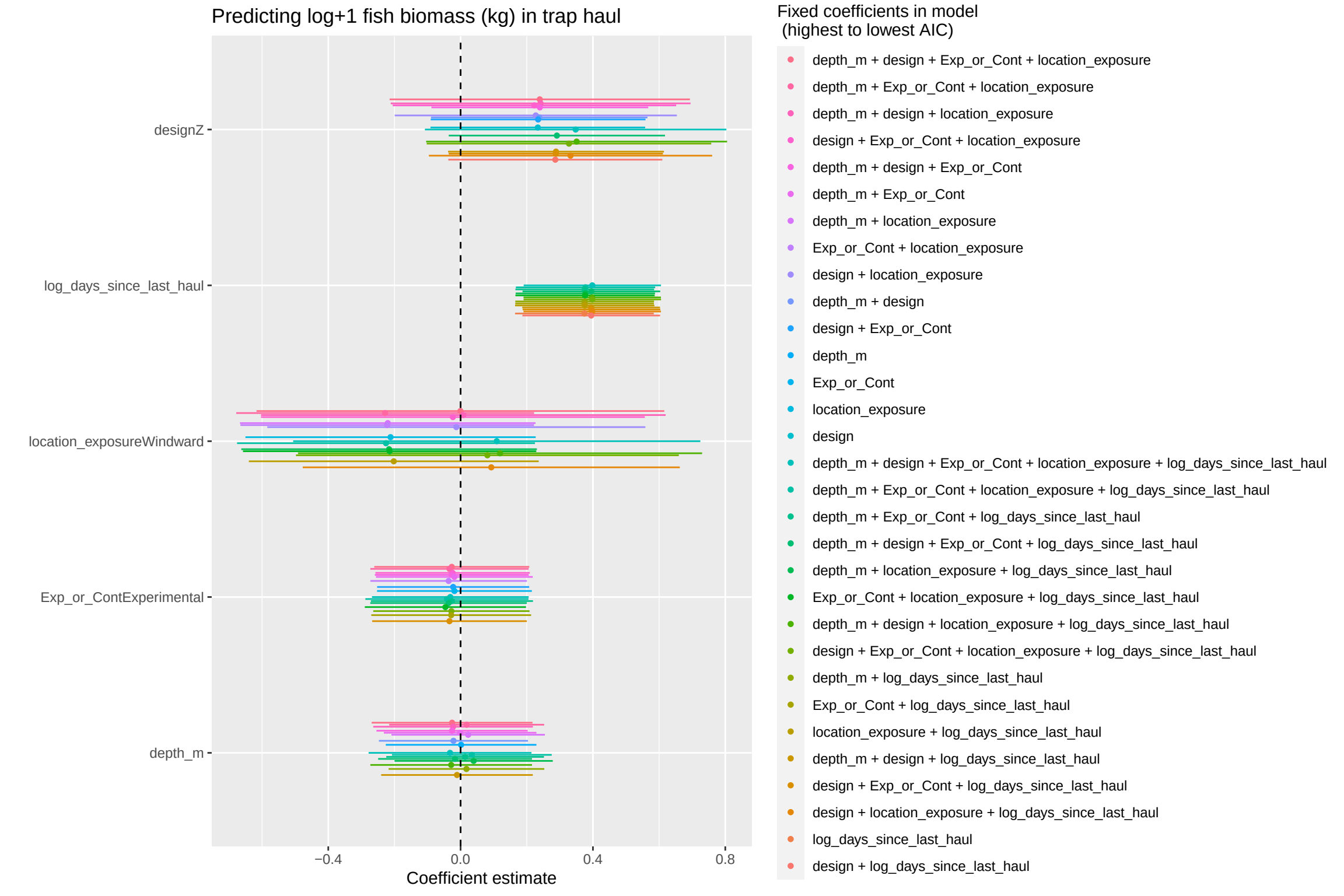

Normal distribution
log_biomass
norm quantiles
160
58
0.0
0.5
1.0
1.5
2.0
2.5
3.0
−3
−2
−1
0
1
2
3


Log−normal distribution
log_biomass
lnorm quantiles
160
58
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
5
10
15


Gamma distribution
log_biomass
gamma quantiles
160
58
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
1
2
3
4

```
Global model call: lmer(formula = log_biomass ~ 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
19 0.3547              +                                 0.3257  6
17 0.6293                                                0.3087  5
27 0.3034              +                 +               0.3281  7
23 0.3699              +          +                      0.3263  7
20 0.3710 -4.913e-04   +                                 0.3254  7
25 0.6451                                +               0.3094  6
21 0.6433                          +                     0.3091  6
18 0.5997  7.952e-04                                     0.3093  6
31 0.3225              +          +       +               0.3283  8
28 0.3309 -1.279e-03   +                  +               0.3281  8
29 0.6687                          +       +               0.3102  7
26 0.5802  1.774e-03                      +               0.3109  7
24 0.3960 -7.525e-04   +          +                      0.3260  8
22 0.6195  6.120e-04               +                     0.3096  7
30 0.6104  1.529e-03               +       +               0.3114  8
32 0.3557 -1.437e-03   +          +       +               0.3284  9
1  1.3210                                                        4
3  1.1270              +                                         5
9  1.3390                                +                       5
5  1.3310                          +                             5
2  1.3190  6.780e-05                                            5
7  1.1380              +          +                             6
4  1.1580 -9.690e-04   +                                        6
11 1.1330              +                 +                     6
13 1.3590                          +       +                   6
10 1.3040  1.025e-03                      +                     6
6  1.3330 -6.282e-05               +                           6
8  1.1770 -1.160e-03   +          +                             7
15 1.1500              +          +       +                     7
12 1.1560 -1.022e-03   +                  +                     7
14 1.3290  8.271e-04               +       +                     7
16 1.1770 -1.157e-03   +          +       +                     8
     logLik  AICc delta weight
19 -235.794 483.9  0.00  0.225
17 -237.268 484.8  0.85  0.147
27 -235.744 485.9  2.01  0.082
23 -235.754 486.0  2.03  0.081
```

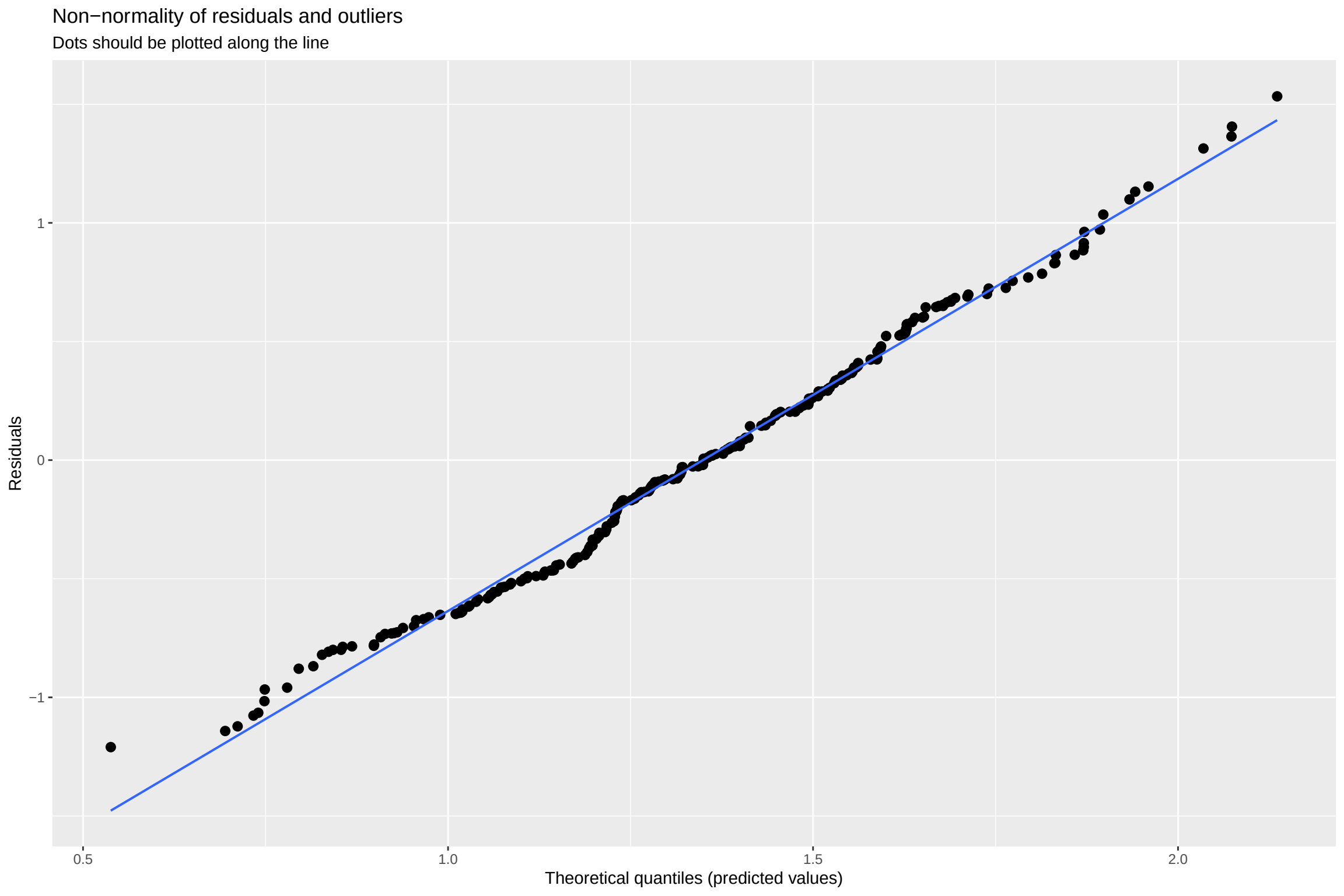
model	sigma	logLik	AIC	BIC	deviance	df.residual
design + log_days_since_last_haul	0.56	−235.79	483.59	504.93	471.59	253
log_days_since_last_haul	0.56	−237.27	484.54	502.32	474.54	254
design + location_exposure + log_days_since_last_haul	0.56	−235.74	485.49	510.39	471.49	252
design + Exp_or_Cont + log_days_since_last_haul	0.56	−235.75	485.51	510.41	471.51	252
depth_m + design + log_days_since_last_haul	0.56	−235.79	485.58	510.48	471.58	252
location_exposure + log_days_since_last_haul	0.56	−236.86	485.72	507.06	473.72	253
Exp_or_Cont + log_days_since_last_haul	0.56	−237.24	486.48	507.82	474.48	253
depth_m + log_days_since_last_haul	0.56	−237.26	486.51	507.85	474.51	253
design + Exp_or_Cont + location_exposure + log_days_since_last_haul	0.56	−235.72	487.43	515.89	471.43	251
depth_m + design + location_exposure + log_days_since_last_haul	0.56	−235.72	487.44	515.89	471.44	251
Exp_or_Cont + location_exposure + log_days_since_last_haul	0.56	−236.79	487.59	512.48	473.59	252
depth_m + location_exposure + log_days_since_last_haul	0.56	−236.81	487.62	512.52	473.62	252
depth_m + design + Exp_or_Cont + log_days_since_last_haul	0.56	−235.74	487.49	515.94	471.49	251
depth_m + Exp_or_Cont + log_days_since_last_haul	0.56	−237.23	488.47	513.37	474.47	252
depth_m + Exp_or_Cont + location_exposure + log_days_since_last_haul	0.56	−236.75	489.51	517.96	473.51	251
depth_m + design + Exp_or_Cont + location_exposure + log_days_since_last_haul	0.56	−235.69	489.37	521.38	471.37	250
none	0.56	−241.97	491.94	506.17	483.94	255
design	0.56	−240.99	491.97	509.76	481.97	254
location_exposure	0.56	−241.52	493.05	510.83	483.05	254
Exp_or_Cont	0.56	−241.96	493.91	511.70	483.91	254
depth_m	0.56	−241.97	493.94	511.72	483.94	254
design + Exp_or_Cont	0.56	−240.97	493.94	515.28	481.94	253
depth_m + design	0.56	−240.97	493.94	515.28	481.94	253
design + location_exposure	0.56	−240.99	493.97	515.31	481.97	253
Exp_or_Cont + location_exposure	0.56	−241.48	494.96	516.30	482.96	253
depth_m + location_exposure	0.56	−241.51	495.01	516.35	483.01	253
depth_m + Exp_or_Cont	0.56	−241.96	495.91	517.25	483.91	253
depth_m + design + Exp_or_Cont	0.56	−240.94	495.89	520.79	481.89	252
design + Exp_or_Cont + location_exposure	0.56	−240.97	495.93	520.83	481.93	252
depth_m + design + location_exposure	0.56	−240.97	495.94	520.84	481.94	252
depth_m + Exp_or_Cont + location_exposure	0.56	−241.47	496.94	521.83	482.94	252
depth_m + design + Exp_or_Cont + location_exposure	0.56	−240.94	497.89	526.34	481.89	251

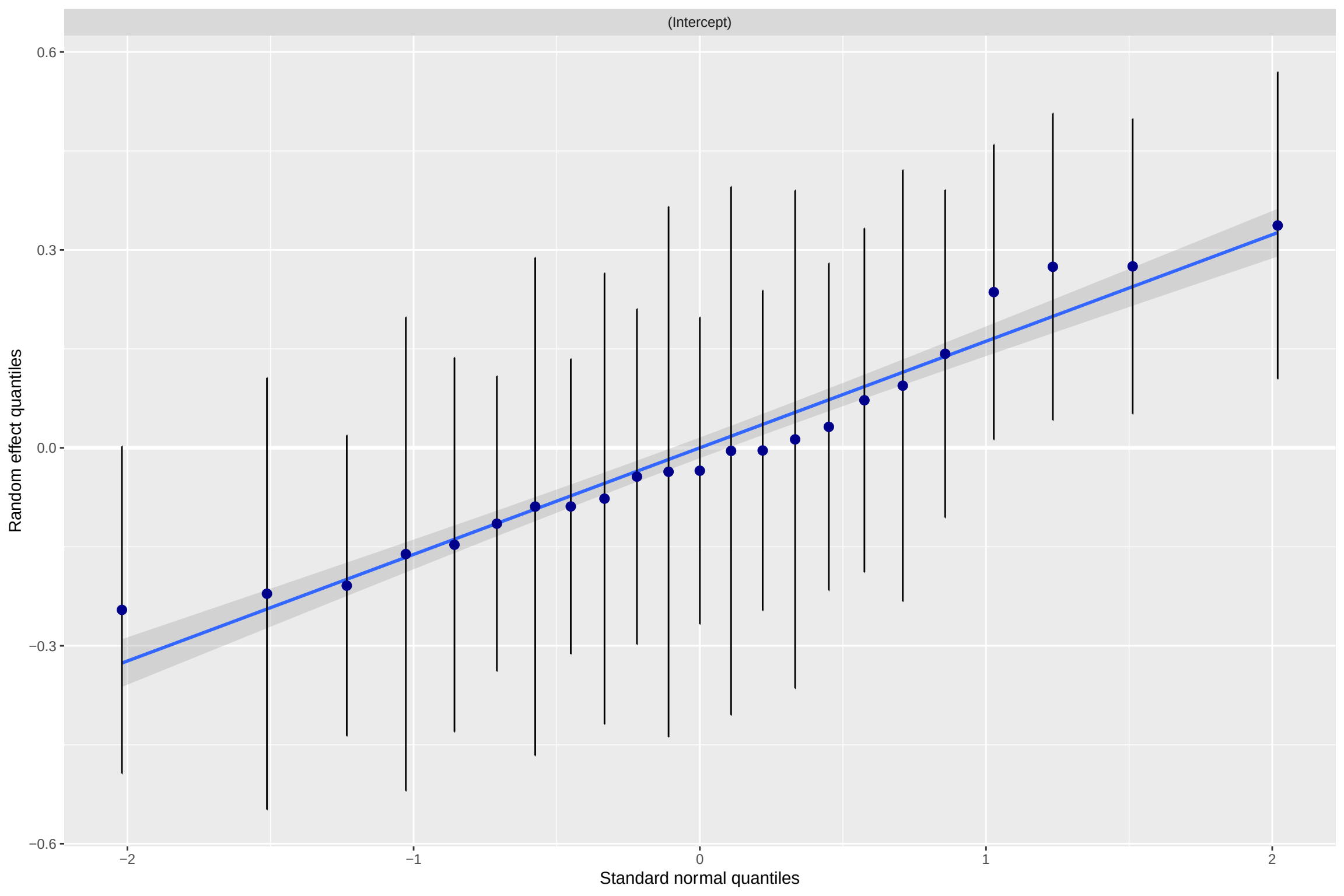

Predicting log+1 fish biomass (kg) in trap haul
designZ
log_days_since_last_haul
location_exposureWindward
Exp_or_ContExperimental
depth_m
−0.4
0.0
0.4
0.8
Coefficient estimate
Fixed coefficients in model
(highest to lowest AIC)
depth_m + design + Exp_or_Cont + location_exposure
depth_m + Exp_or_Cont + location_exposure
depth_m + design + location_exposure
design + Exp_or_Cont + location_exposure
depth_m + design + Exp_or_Cont
depth_m + Exp_or_Cont
depth_m + location_exposure
Exp_or_Cont + location_exposure
design + location_exposure
depth_m + design
design + Exp_or_Cont
depth_m
Exp_or_Cont
location_exposure
design
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 + Exp_or_Cont + log_days_since_last_haul
depth_m + design + Exp_or_Cont + 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 + design + location_exposure + log_days_since_last_haul
design + Exp_or_Cont + location_exposure + log_days_since_last_haul
depth_m + log_days_since_last_haul
Exp_or_Cont + log_days_since_last_haul
location_exposure + log_days_since_last_haul
depth_m + design + log_days_since_last_haul
design + Exp_or_Cont + log_days_since_last_haul
design + location_exposure + log_days_since_last_haul
log_days_since_last_haul
design + log_days_since_last_haul

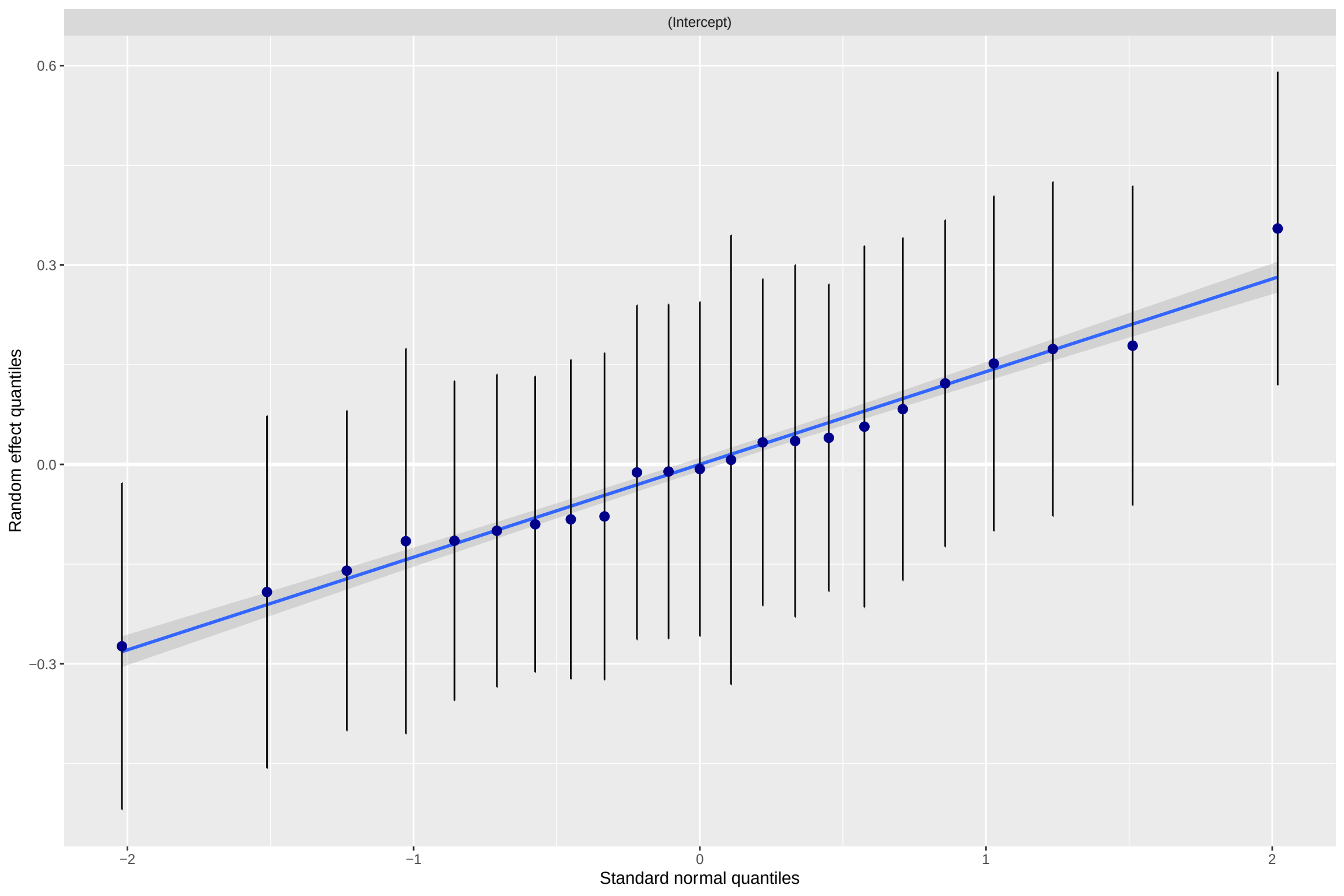
```
Backward reduced random-effect table:

               Eliminated npar  logLik    AIC     LRT Df Pr(>Chisq)
<none>                      9 -235.69 489.37
(1 | TrapID)            0   8 -242.77 501.54 14.1705  1   0.000167 ***
(1 | Date_YMD)          0   8 -239.73 495.47  8.0967  1   0.004434 **
---
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
depth_m                           1 0.0203  0.0203     1 19.836  0.0647
Exp_or_Cont                       2 0.0168  0.0168     1 21.719  0.0535
location_exposure                 3 0.0319  0.0319     1 83.096  0.1017
design                            4 0.9433  0.9433     1 66.888  3.0092
log_days_since_last_haul          0 3.8558  3.8558     1 24.596 12.2458
                           Pr(>F)
depth_m                  0.801763
Exp_or_Cont              0.819274
location_exposure        0.750595
design                   0.087398 .
log_days_since_last_haul 0.001798 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

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

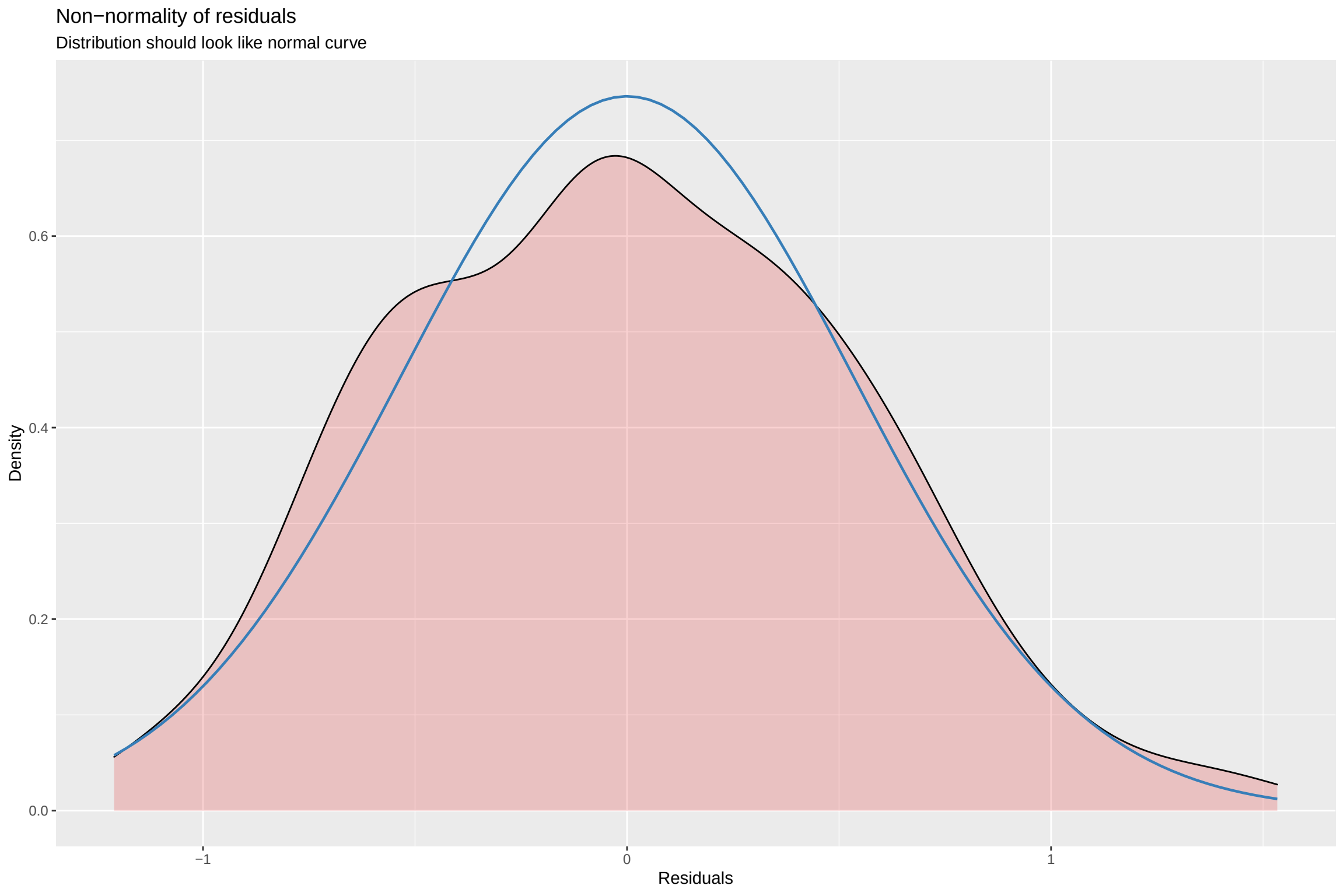
Optimal model found using 'step' function which performs backward elimination of fixed−effect terms

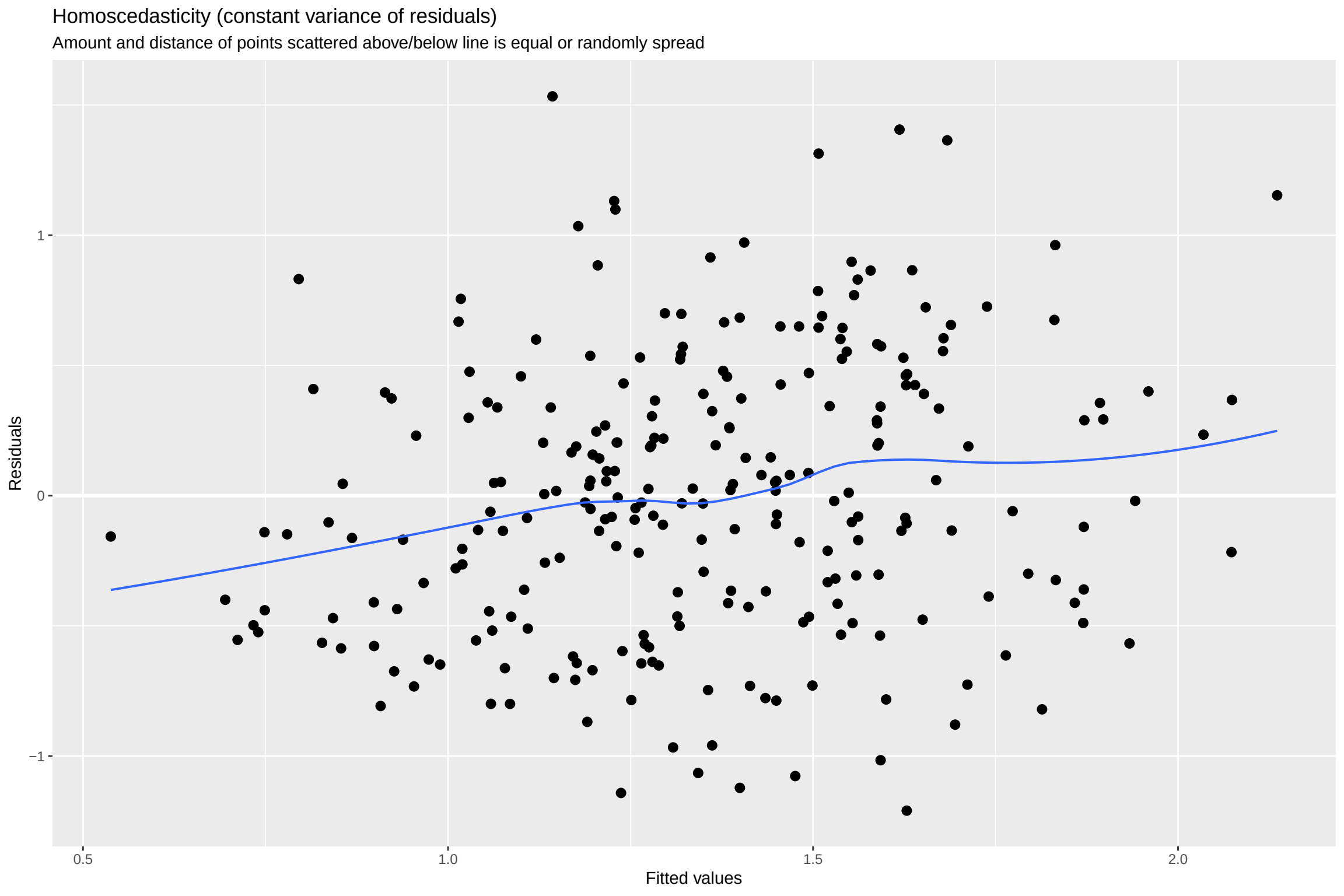
```
Linear mixed model fit by maximum likelihood . t−tests use
  Satterthwaite's method [lmerModLmerTest]
Formula: log_biomass ~ log_days_since_last_haul + (1 | TrapID) + (1 |
    Date_YMD)
   Data: trap_haul_no_zero_depth

     AIC      BIC   logLik deviance df.resid
   484.5    502.3   −237.3    474.5      254

Scaled residuals:
     Min       1Q   Median       3Q      Max
−2.15571 −0.75091 −0.03651  0.66536  2.73301

Random effects:
 Groups   Name        Variance Std.Dev.
 TrapID   (Intercept) 0.04780  0.2186
 Date_YMD (Intercept) 0.03568  0.1889
 Residual             0.31487  0.5611
Number of obs: 259, groups:  TrapID, 23; Date_YMD, 23

Fixed effects:
                        Estimate Std. Error       df t value Pr(>|t|)
(Intercept)              0.62928    0.21087 28.02857   2.984  0.00584 **
log_days_since_last_haul 0.30868    0.08821 24.59558   3.499  0.00180 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Correlation of Fixed Effects:
            (Intr)
lg_dys_sn__ −0.938
```


Non−normality of residuals and outliers
Dots should be plotted along the line
Residuals
1
0
−1
0.5
1.0
1.5
2.0
Theoretical quantiles (predicted values)


(Intercept)
0.6
0.3
0.0
−0.3
−0.6
Random effect quantiles
−2
−1
0
1
2
Standard normal quantiles


(Intercept)
0.6
0.3
0.0
−0.3
Random effect quantiles
−2
−1
0
1
2
Standard normal quantiles


Non−normality of residuals
Distribution should look like normal curve
Density
0.6
0.4
0.2
0.0
−1
0
1
Residuals


Homoscedasticity (constant variance of residuals)
Amount and distance of points scattered above/below line is equal or randomly spread
Residuals
1
0
−1
0.5
1.0
1.5
2.0
Fitted values

Model summaries for all models with delta AIC < 2

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

     AIC      BIC   logLik deviance df.resid
   483.6    504.9   -235.8    471.6      253

Scaled residuals:
     Min       1Q   Median       3Q      Max
-2.19251 -0.75747 -0.00531  0.65725  2.72597

Random effects:
 Groups   Name        Variance Std.Dev.
 TrapID   (Intercept) 0.04293  0.2072
 Date_YMD (Intercept) 0.03400  0.1844
 Residual             0.31346  0.5599
Number of obs: 259, groups:  TrapID, 23; Date_YMD, 23

Fixed effects:
                          Estimate Std. Error       df t value Pr(>|t|)
(Intercept)               0.35473    0.26242 60.76337   1.352  0.18147
designZ                   0.28628    0.16503 66.88796   1.735  0.08740 .
log_days_since_last_haul  0.32566    0.08756 25.19514   3.719  0.00101 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Correlation of Fixed Effects:
            (Intr) desgnZ
designZ     -0.613
lg_dys_sn__ -0.810  0.120

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

     AIC      BIC   logLik deviance df.resid
   484.5    502.3   -237.3    474.5      254

Scaled residuals:
     Min       1Q   Median       3Q      Max
-2.15571 -0.75091 -0.03651  0.66536  2.73301

Random effects:
 Groups   Name        Variance Std.Dev.
 TrapID   (Intercept) 0.04780  0.2186
 Date_YMD (Intercept) 0.03568  0.1889
 Residual             0.31487  0.5611
Number of obs: 259, groups:  TrapID, 23; Date_YMD, 23

Fixed effects:
                          Estimate Std. Error       df t value Pr(>|t|)
(Intercept)               0.62928    0.21087 28.02857   2.984  0.00584 **
log_days_since_last_haul  0.30868    0.08821 24.59558   3.499  0.00180 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Correlation of Fixed Effects:
            (Intr)
lg_dys_sn__ -0.938
```

Full model summary

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

     AIC      BIC   logLik deviance df.resid
   489.4    521.4   -235.7    471.4      250

Scaled residuals:
     Min       1Q   Median       3Q      Max
-2.17470 -0.76768 -0.01432  0.67428  2.71930

Random effects:
 Groups    Name        Variance Std.Dev.
 TrapID   (Intercept) 0.04203  0.2050
 Date_YMD (Intercept) 0.03322  0.1823
 Residual             0.31387  0.5602
Number of obs: 259, groups:  TrapID, 23; Date_YMD, 23

Fixed effects:
                            Estimate Std. Error        df t value Pr(>|t|)
(Intercept)                 0.355708   0.343455 77.280063   1.036 0.303583
designZ                     0.347730   0.232458 62.072994   1.496 0.139751
log_days_since_last_haul    0.328373   0.087354 25.110776   3.759 0.000912
location_exposureWindward   0.109282   0.313994 65.831277   0.348 0.728921
Exp_or_ContExperimental    -0.031063   0.120847 21.364733  -0.257 0.799603
depth_m                    -0.001437   0.005647 19.835844  -0.254 0.801763

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

Correlation of Fixed Effects:
            (Intr) desgnZ lg____ lctn_W Ex__CE
designZ     -0.509
lg_dys_sn__ -0.648  0.137
lctn_xpsrWn -0.336  0.699  0.076
Exp_r_CntEx -0.282  0.047 -0.009  0.119
depth_m     -0.384 -0.335 -0.006 -0.345  0.111
```