

# Factors affecting vessels performance

26-06-2018

## 1) Introduction

This document presents the model fits used by EWG1809 to identify factors affecting vessels's efficiency of the trawl fleets operating in the Northwest Mediterranean. In this exercise vessels' efficiency is defined in terms of CPUE.

### ToR 3 - What are the factors determining vessels' performance?

- 3.1 Identify the factors that may affect vessels' performance (CPUE) in the western Mediterranean demersal fisheries (e.g. seasonal and area effects, vessel type, fisher knowledge, price of fish or fuel). The EWG should use any information available from scientific publications, EU projects and grey literature.
- 3.2 Estimate the relative contribution of the factors identified in TOR 2.1 to the vessels' performance.

## 2) Italy

The model used for Italian data was a mixed effects generalized additive model, of the form:

```
CPUE ~ s(Year, k = 3) + s(Depth, k = 4) + as.factor(Season) +  
      as.factor(LOAMP1) + s(Species_Price, k = 4) + s(sppfrac,  
      k = 4) + as.factor(GSA) + gam::random(CFR)
```

Family: Gamma

Link function: log

where 'LOAMP1' are the lenght-over-all classes set in the MAP proposal ((0,12], (12,18], (18,24], (24,40]), 'sppfrac' is the fraction of the landings of the species, and 'CFR' is the vessel identifier anonymized.

## 2.1) Hake

The tables below show the coefficients estimated for each factor and smoother, including the information about potential statistical significance.

Table 1: Effects non-smoothers estimates

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	2.280	0.021	107.524	0.000
as.factor(Season)Spring	-0.005	0.018	-0.278	0.781
as.factor(Season)Summer	-0.031	0.023	-1.350	0.177
as.factor(Season)Winter	-0.085	0.018	-4.708	0.000
as.factor(LOAMP1)(18,24]	0.428	0.017	24.619	0.000
as.factor(LOAMP1)(24,40]	0.568	0.020	28.801	0.000
as.factor(GSA)11	0.461	0.014	33.998	0.000
gam::random(CFR)	0.000	0.000	NaN	NaN

Table 2: Smoothers estimates

	edf	Ref.df	F	p-value
s(Year)	1.991	2.000	63.131	0.000
s(Depth)	2.946	2.998	180.605	0.000
s(Species_Price)	2.614	2.894	2.331	0.057
s(sppfrac)	2.999	3.000	5914.729	0.000

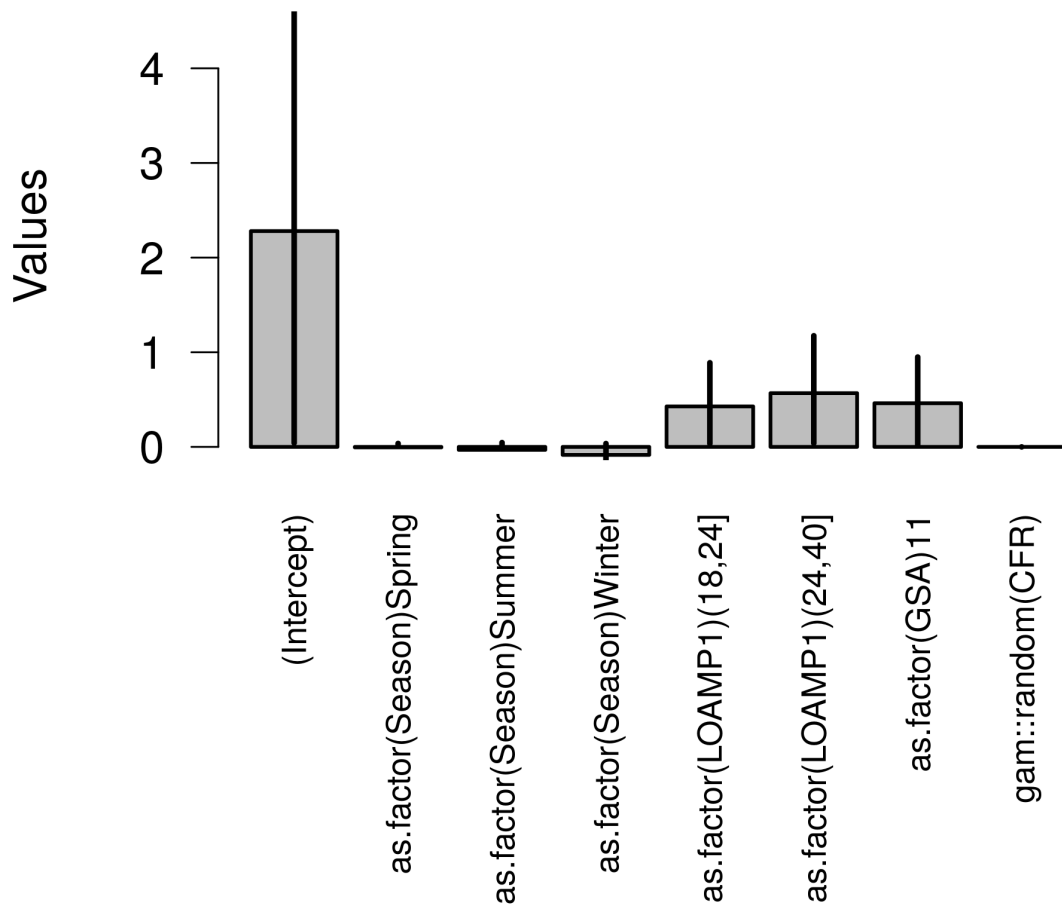


Figure 1: Estimates and related confidence intervals

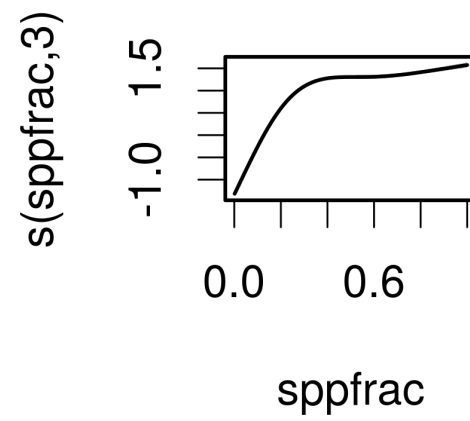
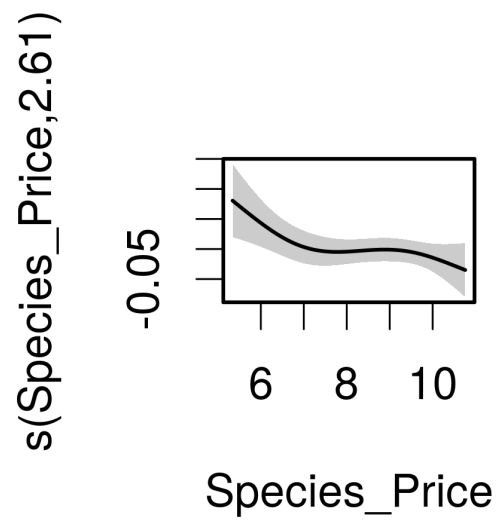
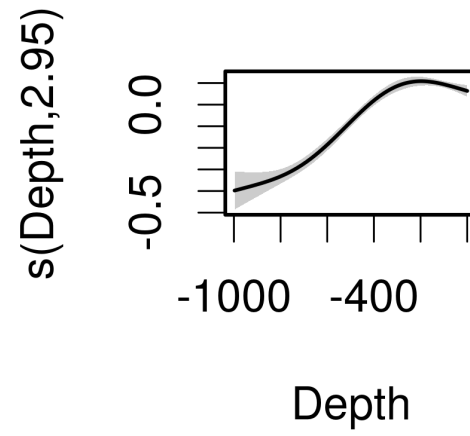
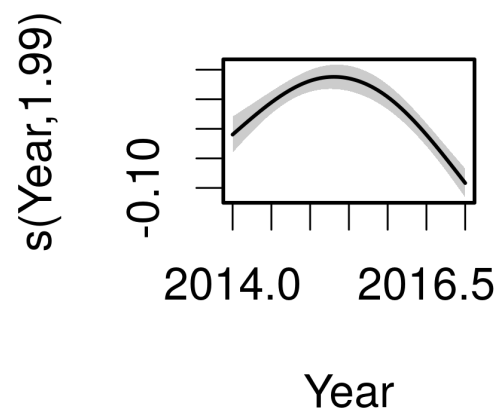


Figure 2: Smoothed effects

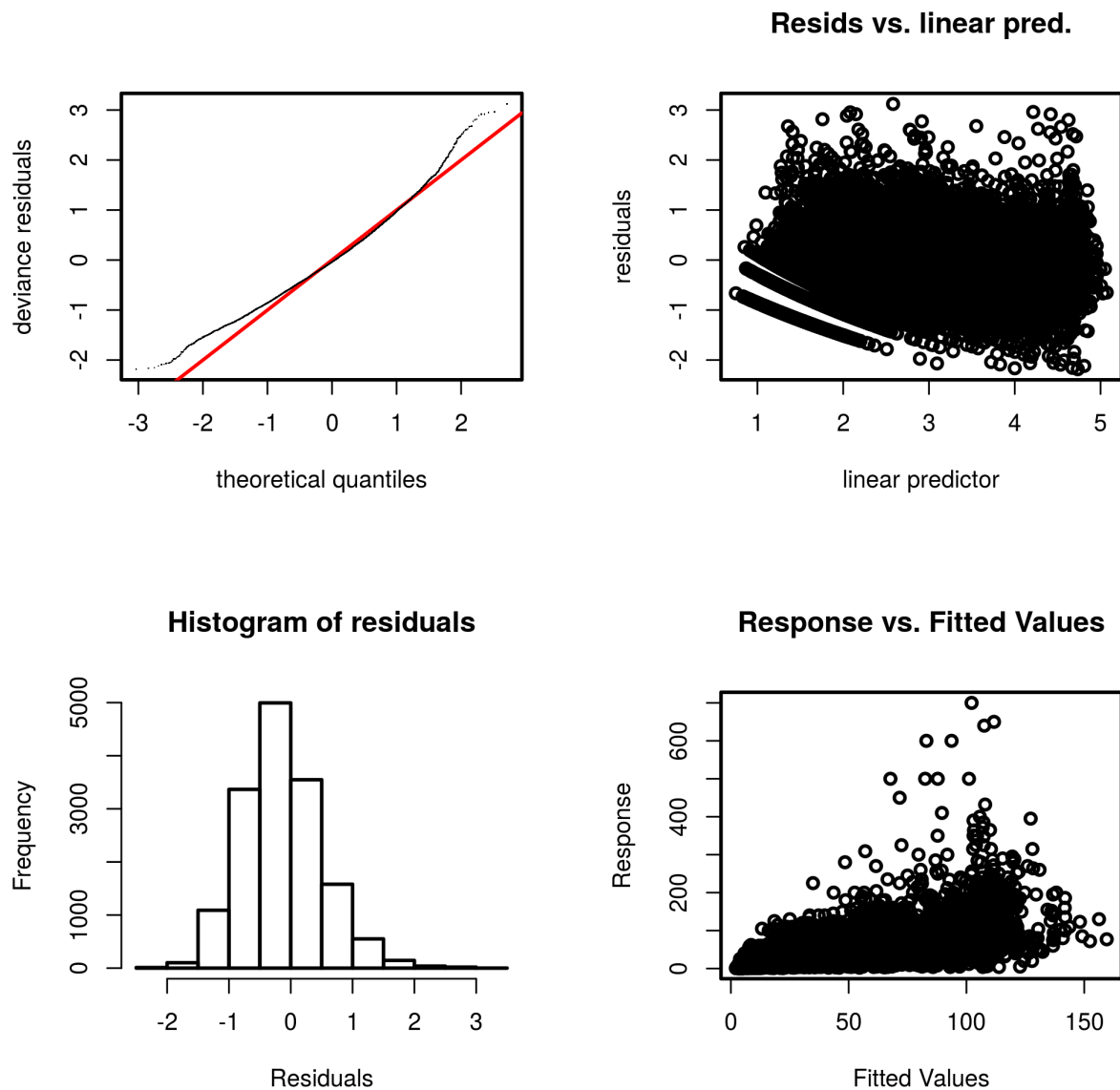


Figure 3: Diagnostics

```
##
## Method: REML   Optimizer: outer newton
## full convergence after 10 iterations.
## Gradient range [-0.003755079,0.003744858]
## (score 57331.91 & scale 0.5087875).
## Hessian positive definite, eigenvalue range [0.4603255,8741.141].
## Model rank = 18 / 19
##
## Basis dimension (k) checking results. Low p-value (k-index<1) may
## indicate that k is too low, especially if edf is close to k'.
##
##          k'   edf k-index p-value
## s(Year)    2.00 1.99   0.93   0.05 *
## s(Depth)    3.00 2.95   0.84 <2e-16 ***
## s(Species_Price) 3.00 2.61   0.94   0.23
## s(sppfrac)   3.00 3.00   0.75 <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

## 2.2) Deep water rose shrimp

The tables below show the coefficients estimated for each factor and smoother, including the information about potential statistical significance.

Table 3: Effects non-smoothers estimates

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	3.051	0.017	178.408	0.000
as.factor(Season)Spring	0.047	0.017	2.774	0.006
as.factor(Season)Summer	0.015	0.018	0.803	0.422
as.factor(Season)Winter	-0.051	0.018	-2.914	0.004
as.factor(LOAMP1)(18,24]	0.228	0.014	16.238	0.000
as.factor(LOAMP1)(24,40]	0.377	0.020	19.310	0.000
as.factor(GSA)11	0.471	0.018	26.807	0.000
gam::random(CFR)	0.000	0.000	NaN	NaN

Table 4: Smoothers estimates

	edf	Ref.df	F	p-value
s(Year)	1.918	1.993	18.674	0
s(Depth)	2.988	3.000	220.601	0
s(Species_Price)	2.739	2.952	15.929	0
s(sppfrac)	2.999	3.000	8066.341	0

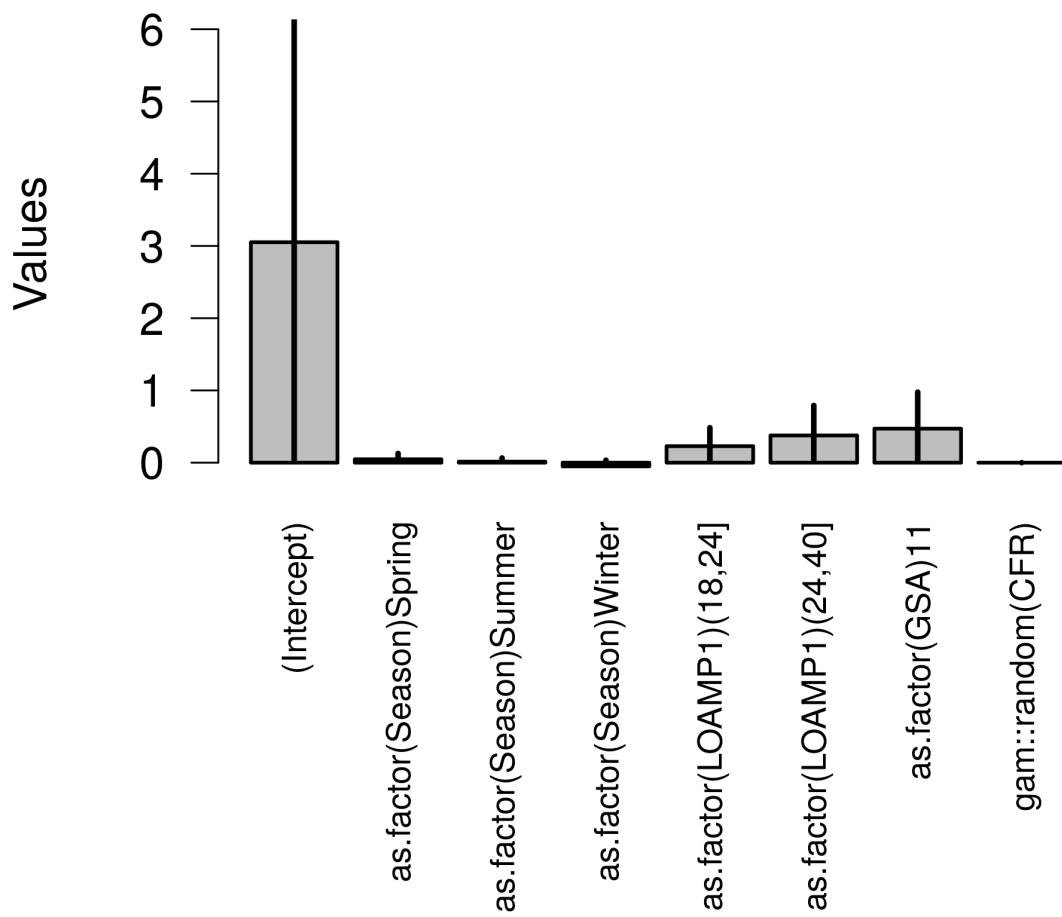


Figure 4: Estimates and related confidence intervals

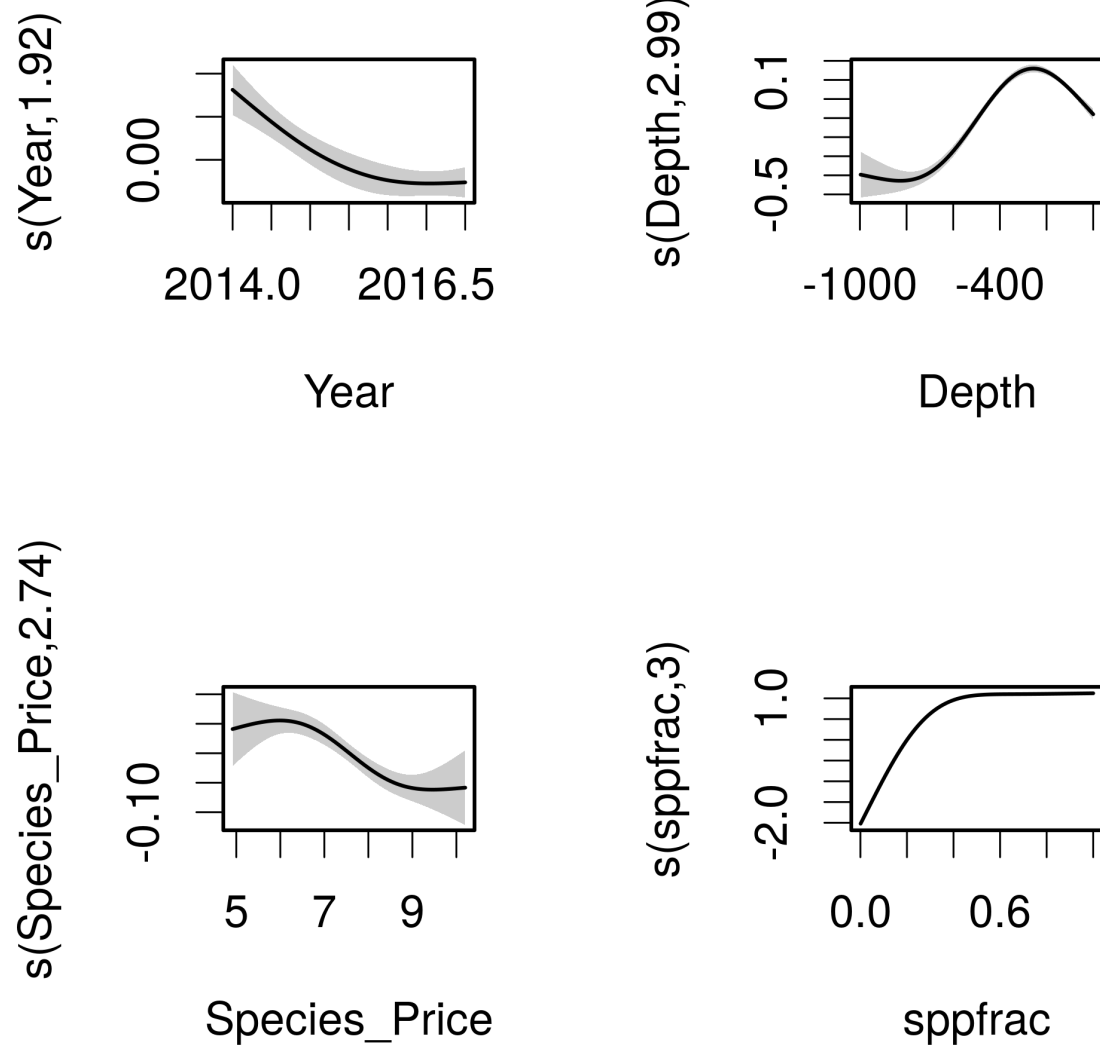


Figure 5: Smoothed effects



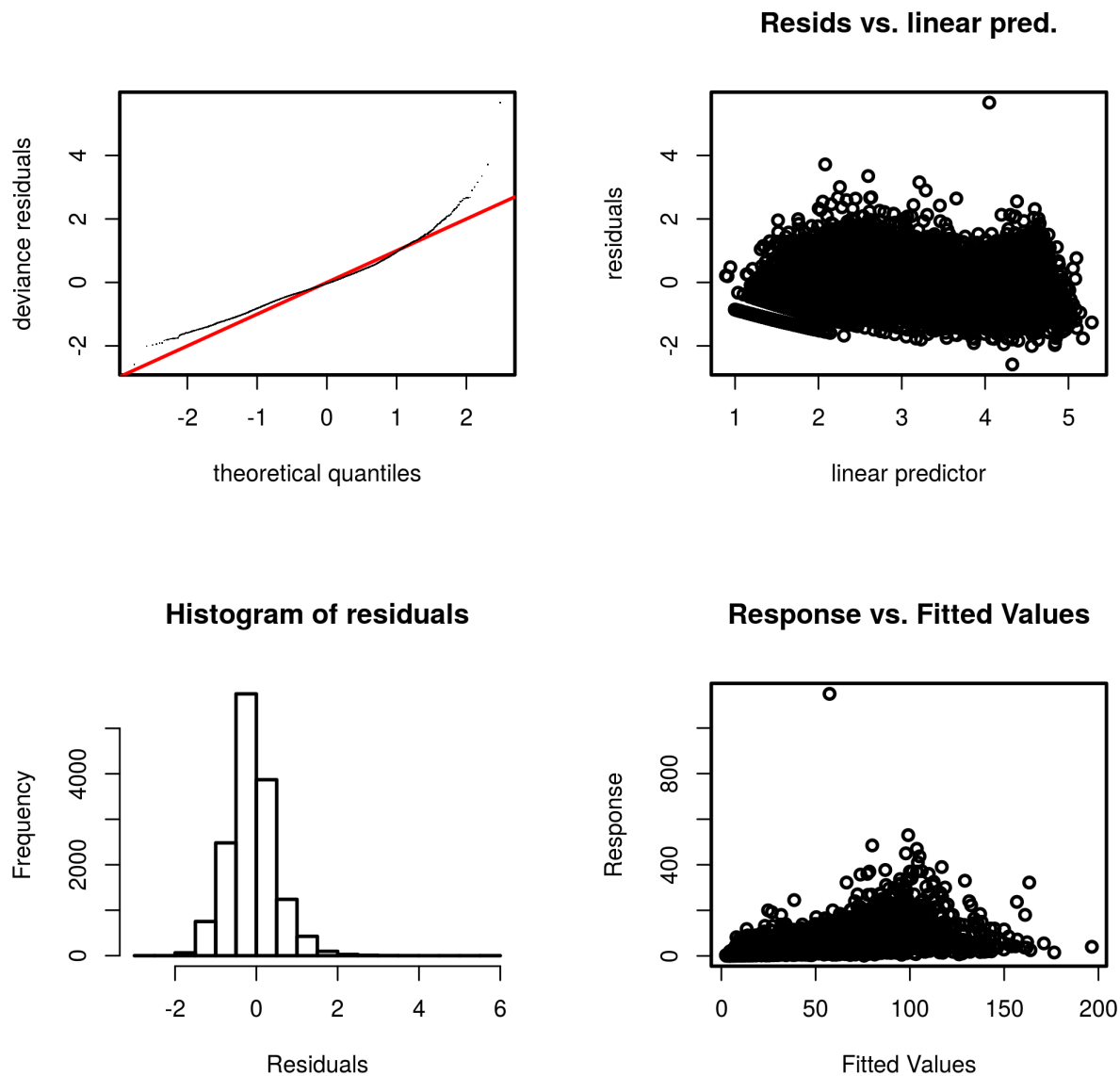


Figure 6: Diagnostics

```
##
## Method: REML   Optimizer: outer newton
## full convergence after 13 iterations.
## Gradient range [-0.01902172,0.000150436]
## (score 60976.95 & scale 0.4269502).
## Hessian positive definite, eigenvalue range [0.4206783,8139.023].
## Model rank = 18 / 19
##
## Basis dimension (k) checking results. Low p-value (k-index<1) may
## indicate that k is too low, especially if edf is close to k'.
##
##          k'   edf k-index p-value
## s(Year)      2.00 1.92   0.96   0.47
## s(Depth)      3.00 2.99   0.88 <2e-16 ***
## s(Species_Price) 3.00 2.74   0.95   0.15
## s(sppfrac)    3.00 3.00   0.83 <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

### 2.3) Red mullet

The tables below show the coefficients estimated for each factor and smoother, including the information about potential statistical significance.

Table 5: Effects non-smoothers estimates

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	2.984	0.022	137.726	0.000
as.factor(Season)Spring	-0.094	0.026	-3.660	0.000
as.factor(Season)Summer	-0.097	0.029	-3.379	0.001
as.factor(Season)Winter	-0.167	0.021	-7.959	0.000
as.factor(LOAMP1)(18,24]	0.237	0.015	15.350	0.000
as.factor(LOAMP1)(24,40]	0.121	0.020	6.016	0.000
as.factor(GSA)11	0.266	0.017	15.646	0.000
gam::random(CFR)	0.000	0.000	NaN	NaN

Table 6: Smoothers estimates

	edf	Ref.df	F	p-value
s(Year)	1.968	1.999	22.983	0
s(Depth)	2.938	2.997	33.855	0
s(Species_Price)	2.803	2.970	8.068	0
s(sppfrac)	2.998	3.000	6178.703	0

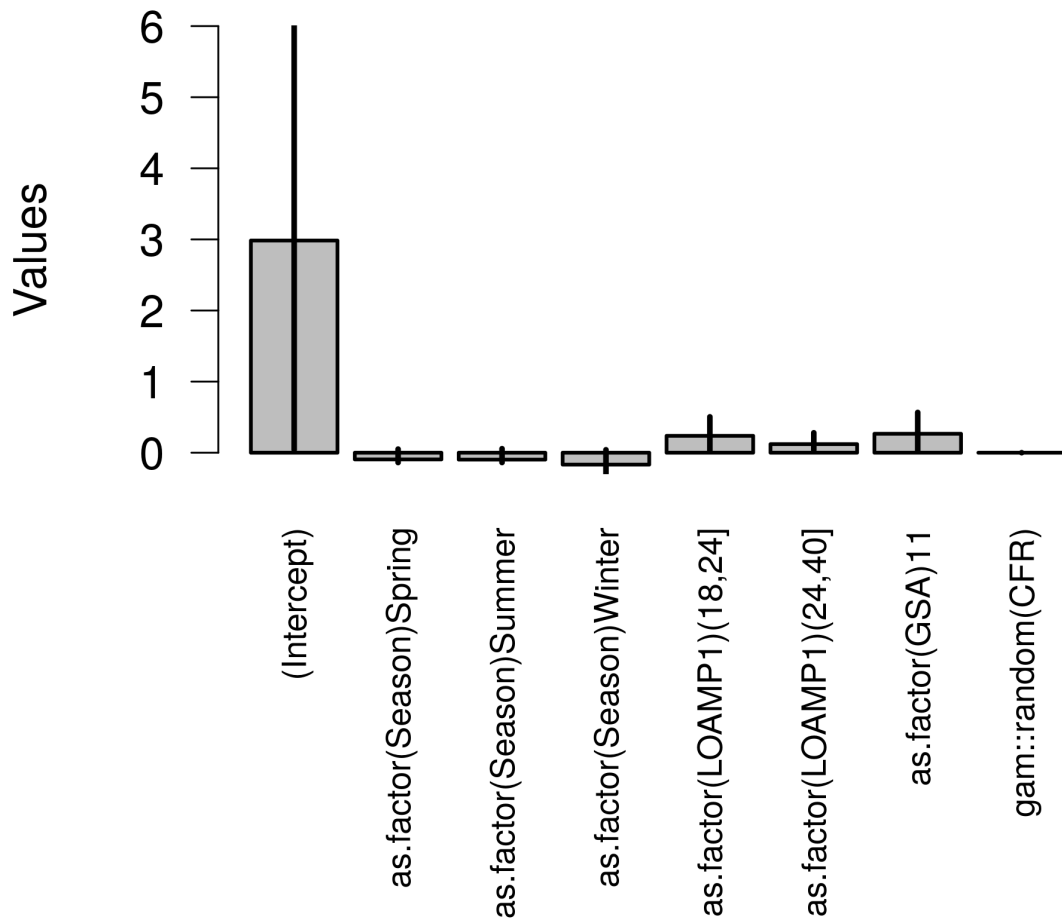


Figure 7: Estimates and related confidence intervals

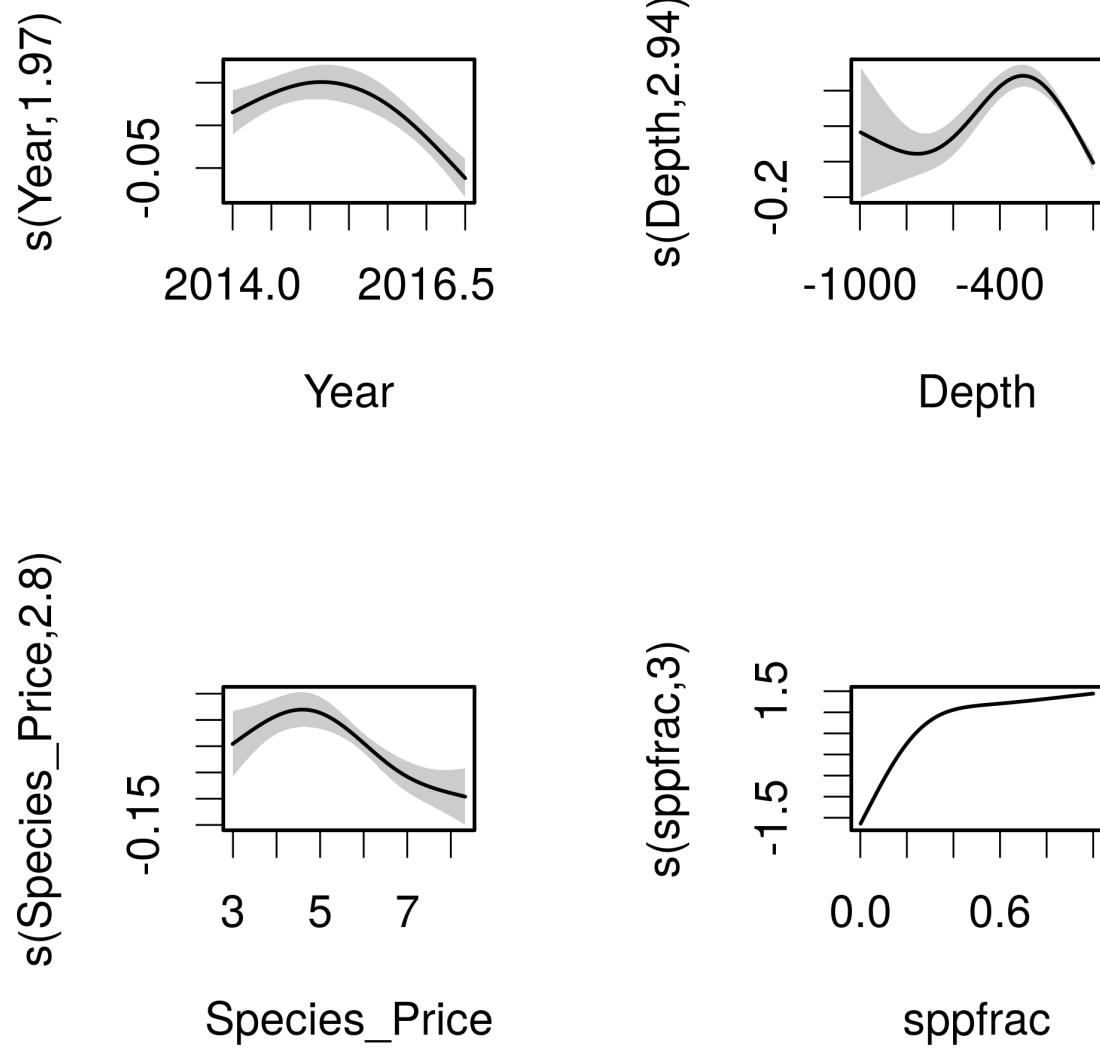


Figure 8: Smoothed effects

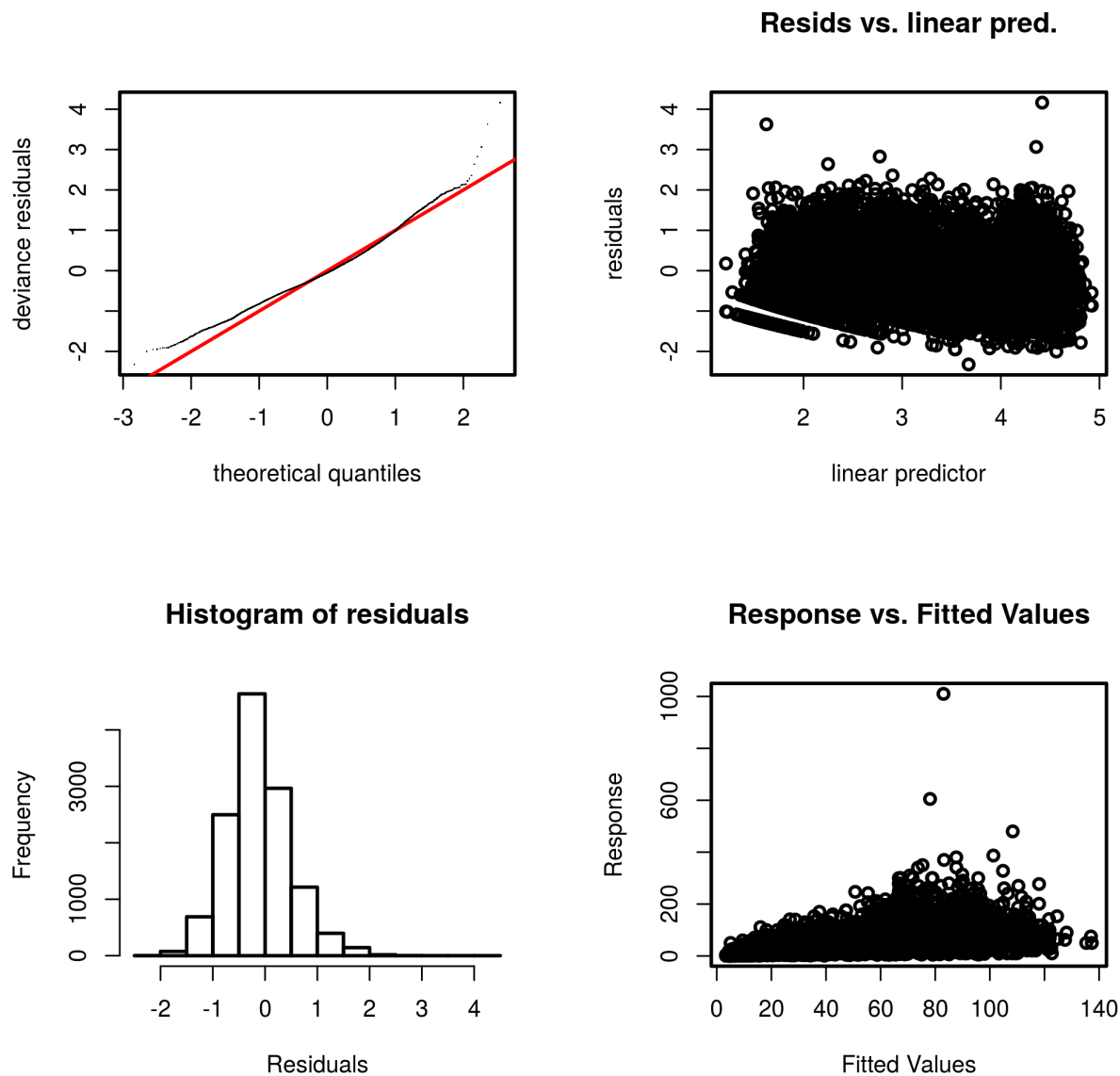


Figure 9: Diagnostics

```
##
## Method: REML   Optimizer: outer newton
## full convergence after 13 iterations.
## Gradient range [-0.003812929,0.003799963]
## (score 49467.44 & scale 0.4566085).
## Hessian positive definite, eigenvalue range [0.4683074,7065.823].
## Model rank = 18 / 19
##
## Basis dimension (k) checking results. Low p-value (k-index<1) may
## indicate that k is too low, especially if edf is close to k'.
##
##          k'   edf k-index p-value
## s(Year)      2.00 1.97   0.93 <2e-16 ***
## s(Depth)      3.00 2.94   0.89 <2e-16 ***
## s(Species_Price) 3.00 2.80   0.96   0.54
## s(sppfrac)    3.00 3.00   0.80 <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

## 2.4) Deep-water rose shrimp

The tables below show the coefficients estimated for each factor and smoother, including the information about potential statistical significance.

Table 7: Effects non-smoothers estimates

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	2.176	0.049	44.486	0.000
as.factor(Season)Spring	0.026	0.033	0.807	0.420
as.factor(Season)Summer	0.082	0.033	2.461	0.014
as.factor(Season)Winter	-0.096	0.035	-2.758	0.006
as.factor(LOAMP1)(18,24]	0.446	0.046	9.746	0.000
as.factor(LOAMP1)(24,40]	0.767	0.046	16.786	0.000
as.factor(GSA)11	0.259	0.044	5.921	0.000
gam::random(CFR)	0.000	0.000	NaN	NaN

Table 8: Smoothers estimates

	edf	Ref.df	F	p-value
s(Year)	1.972	1.998	56.366	0.000
s(Depth)	2.793	2.967	25.966	0.000
s(Species_Price)	2.678	2.923	1.486	0.169
s(sppfrac)	2.998	3.000	2142.385	0.000

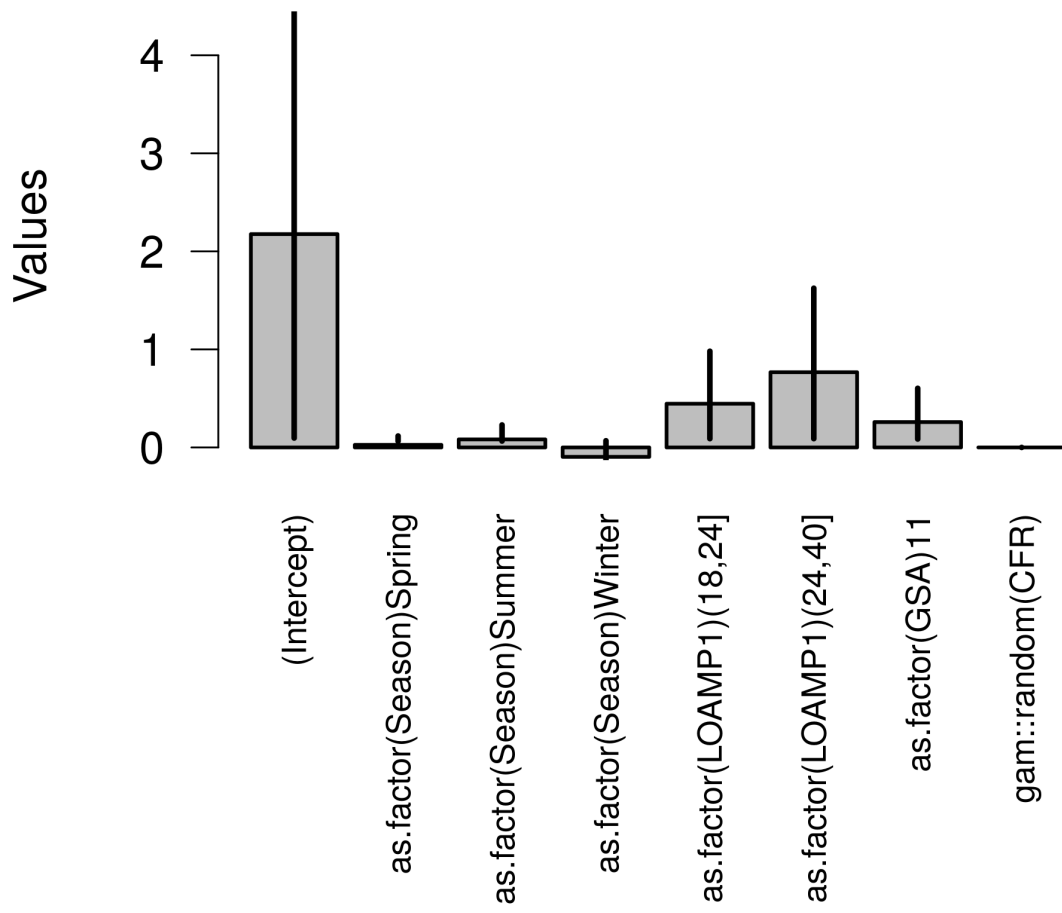


Figure 10: Estimates and related confidence intervals

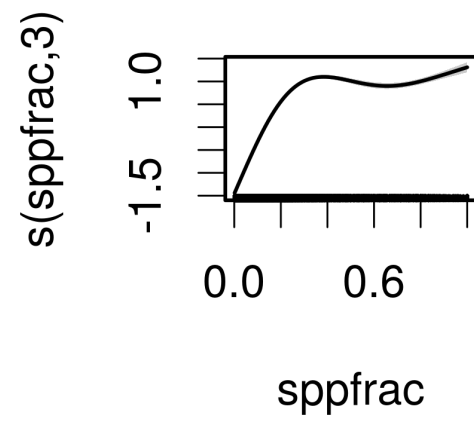
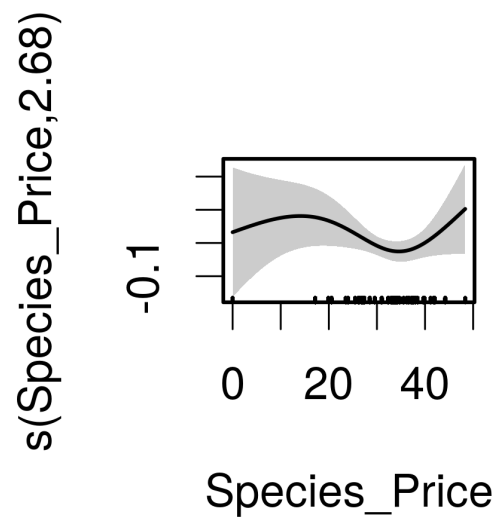
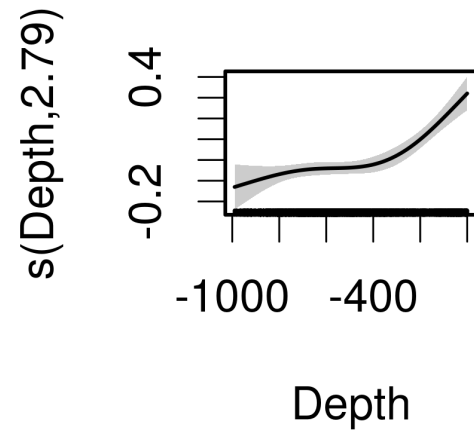
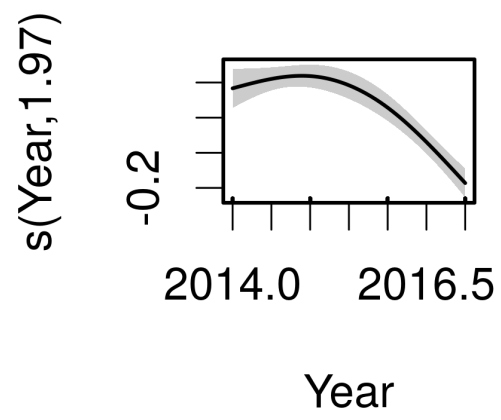


Figure 11: Smoothed effects



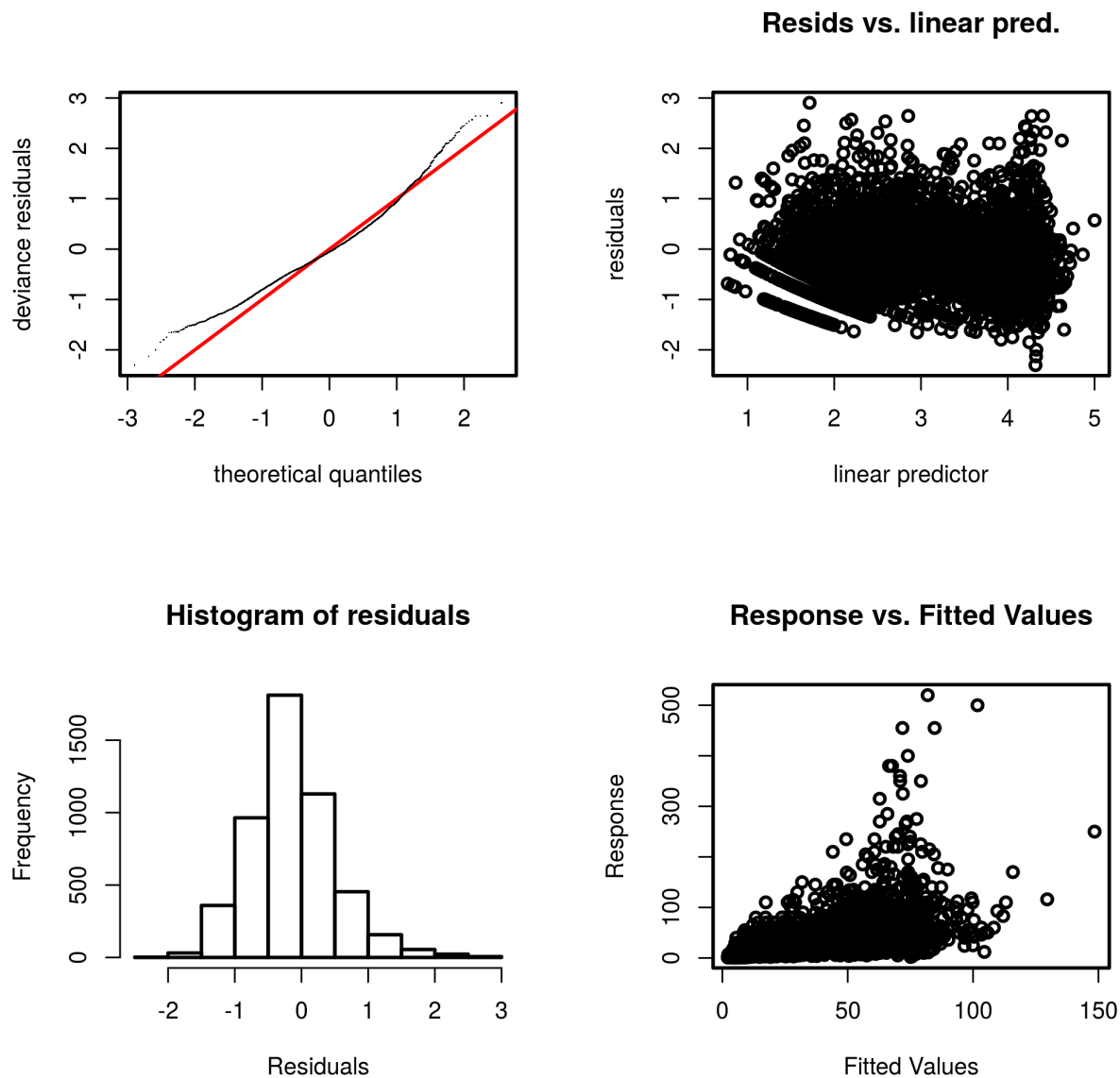


Figure 12: Diagnostics

```
##
## Method: REML   Optimizer: outer newton
## full convergence after 15 iterations.
## Gradient range [-0.002532319,0.002495401]
## (score 19312.9 & scale 0.5278321).
## Hessian positive definite, eigenvalue range [0.4434316,2814.443].
## Model rank = 18 / 19
##
## Basis dimension (k) checking results. Low p-value (k-index<1) may
## indicate that k is too low, especially if edf is close to k'.
##
##          k'   edf k-index p-value
## s(Year)    2.00 1.97   0.53 <2e-16 ***
## s(Depth)    3.00 2.79   0.72 <2e-16 ***
## s(Species_Price) 3.00 2.68   0.61 <2e-16 ***
## s(sppfrac)  3.00 3.00   0.73 <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

## 2.5) Blue and red shrimp

The tables below show the coefficients estimated for each factor and smoother, including the information about potential statistical significance.

Table 9: Effects non-smoothers estimates

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	2.062	0.028	72.761	0.000
as.factor(Season)Spring	0.219	0.025	8.729	0.000
as.factor(Season)Summer	0.103	0.025	4.061	0.000
as.factor(Season)Winter	0.035	0.027	1.294	0.196
as.factor(LOAMP1)(18,24]	0.368	0.027	13.454	0.000
as.factor(LOAMP1)(24,40]	0.276	0.033	8.408	0.000
as.factor(GSA)11	0.982	0.027	35.957	0.000
gam::random(CFR)	0.000	0.000	NaN	NaN

Table 10: Smoothers estimates

	edf	Ref.df	F	p-value
s(Year)	1.994	2.000	102.456	0.000
s(Depth)	2.874	2.988	15.138	0.000
s(Species_Price)	2.800	2.972	4.188	0.006
s(sppfrac)	2.998	3.000	1880.293	0.000

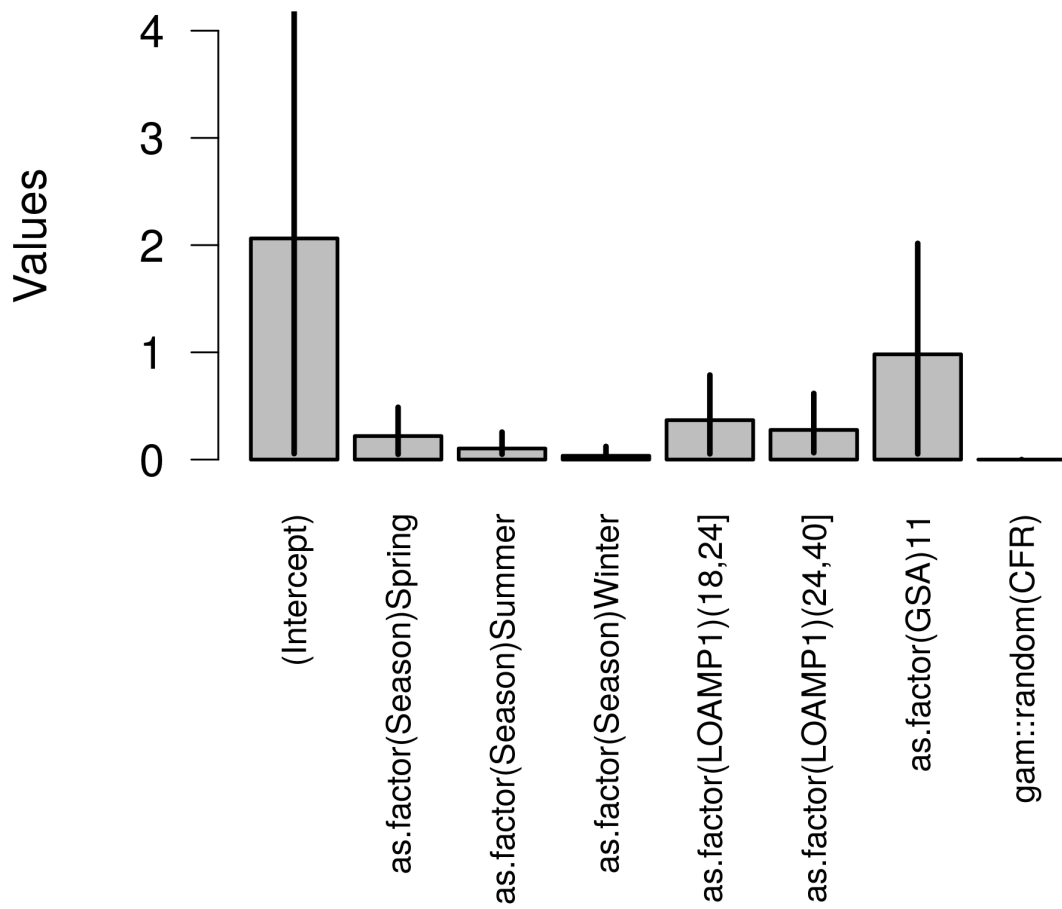


Figure 13: Estimates and related confidence intervals

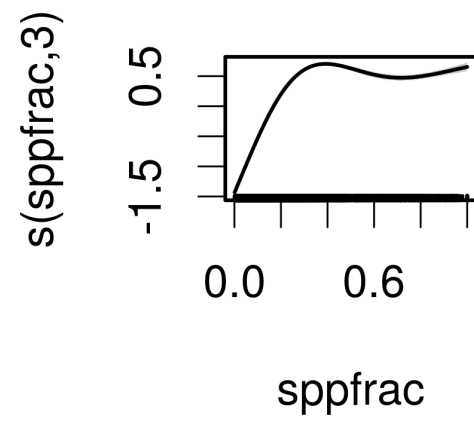
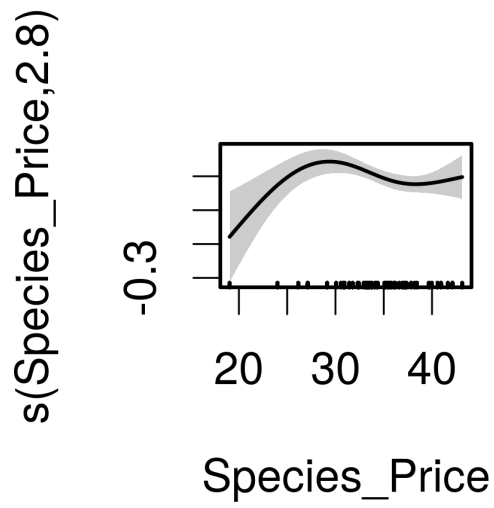
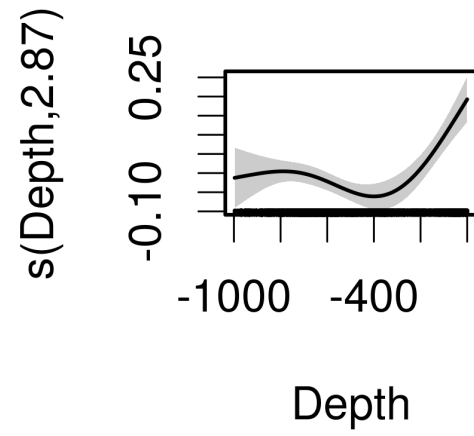
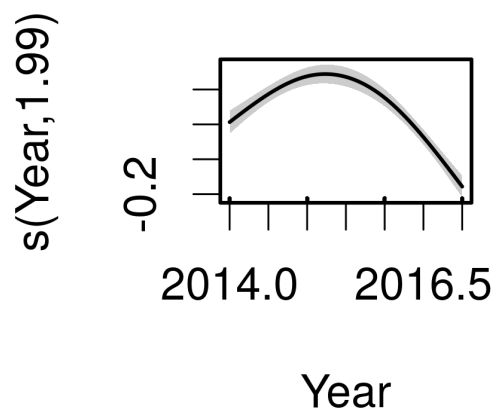


Figure 14: Smoothed effects

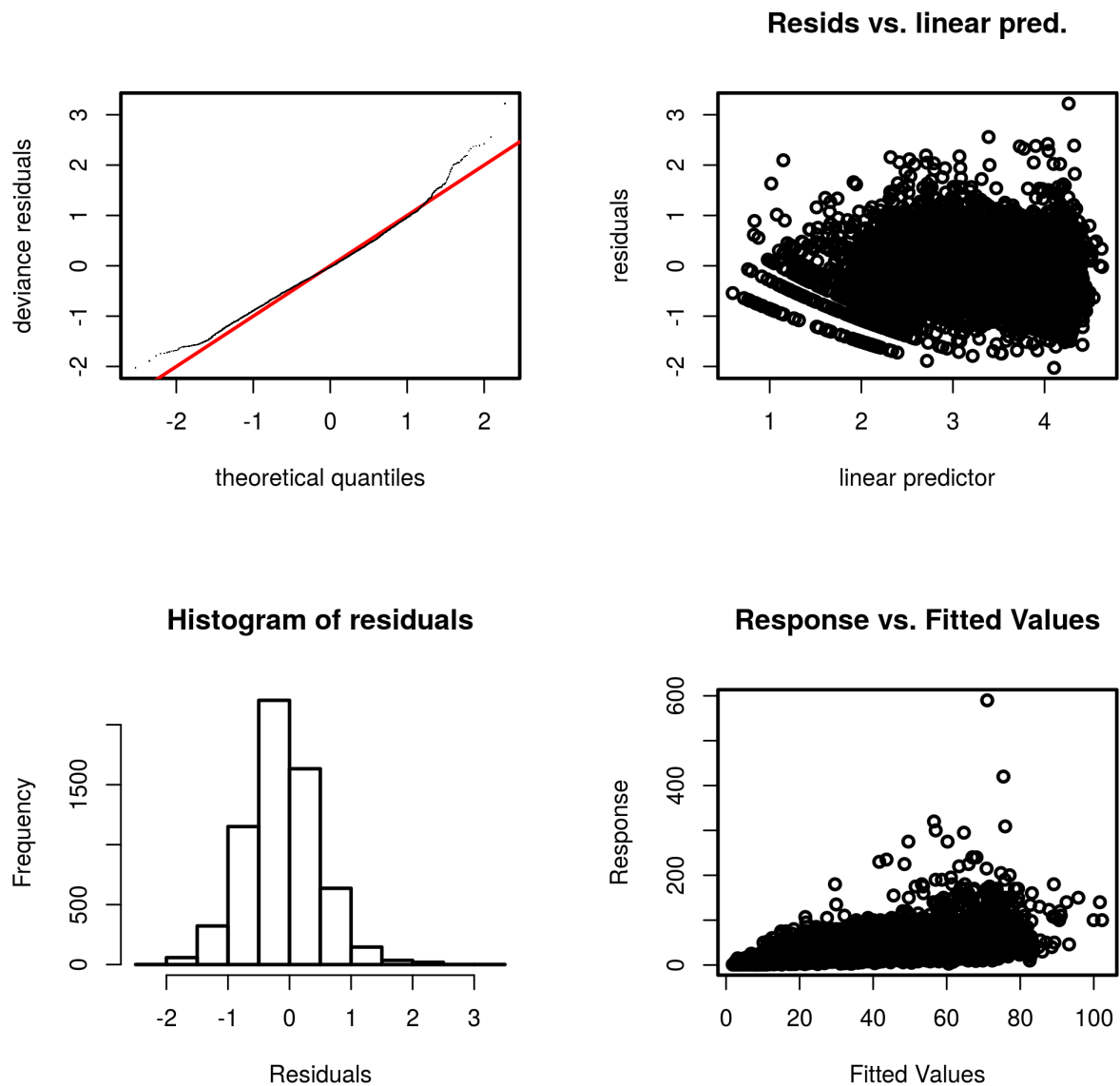


Figure 15: Diagnostics

```
##
## Method: REML   Optimizer: outer newton
## full convergence after 12 iterations.
## Gradient range [-0.0005715543,0.0005587234]
## (score 24202.95 & scale 0.3982369).
## Hessian positive definite, eigenvalue range [0.493731,3444.704].
## Model rank = 18 / 19
##
## Basis dimension (k) checking results. Low p-value (k-index<1) may
## indicate that k is too low, especially if edf is close to k'.
##
##          k'   edf k-index p-value
## s(Year)    2.00 1.99   0.95   0.22
## s(Depth)    3.00 2.87   0.80 <2e-16 ***
## s(Species_Price) 3.00 2.80   0.96   0.39
## s(sppfrac)   3.00 3.00   0.74 <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

## 2.6) Norway lobster

The tables below show the coefficients estimated for each factor and smoother, including the information about potential statistical significance.

Table 11: Effects non-smoothers estimates

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	1.816	0.027	66.568	0.000
as.factor(Season)Spring	0.121	0.025	4.790	0.000
as.factor(Season)Summer	0.112	0.026	4.266	0.000
as.factor(Season)Winter	0.009	0.028	0.318	0.751
as.factor(LOAMP1)(18,24]	0.284	0.022	12.725	0.000
as.factor(LOAMP1)(24,40]	0.371	0.030	12.484	0.000
as.factor(GSA)11	0.514	0.023	22.349	0.000
gam::random(CFR)	0.000	0.000	NaN	NaN

Table 12: Smoothers estimates

	edf	Ref.df	F	p-value
s(Year)	1.955	1.998	9.738	0.000
s(Depth)	2.730	2.945	15.159	0.000
s(Species_Price)	1.154	1.289	11.214	0.001
s(sppfrac)	2.998	3.000	3463.705	0.000

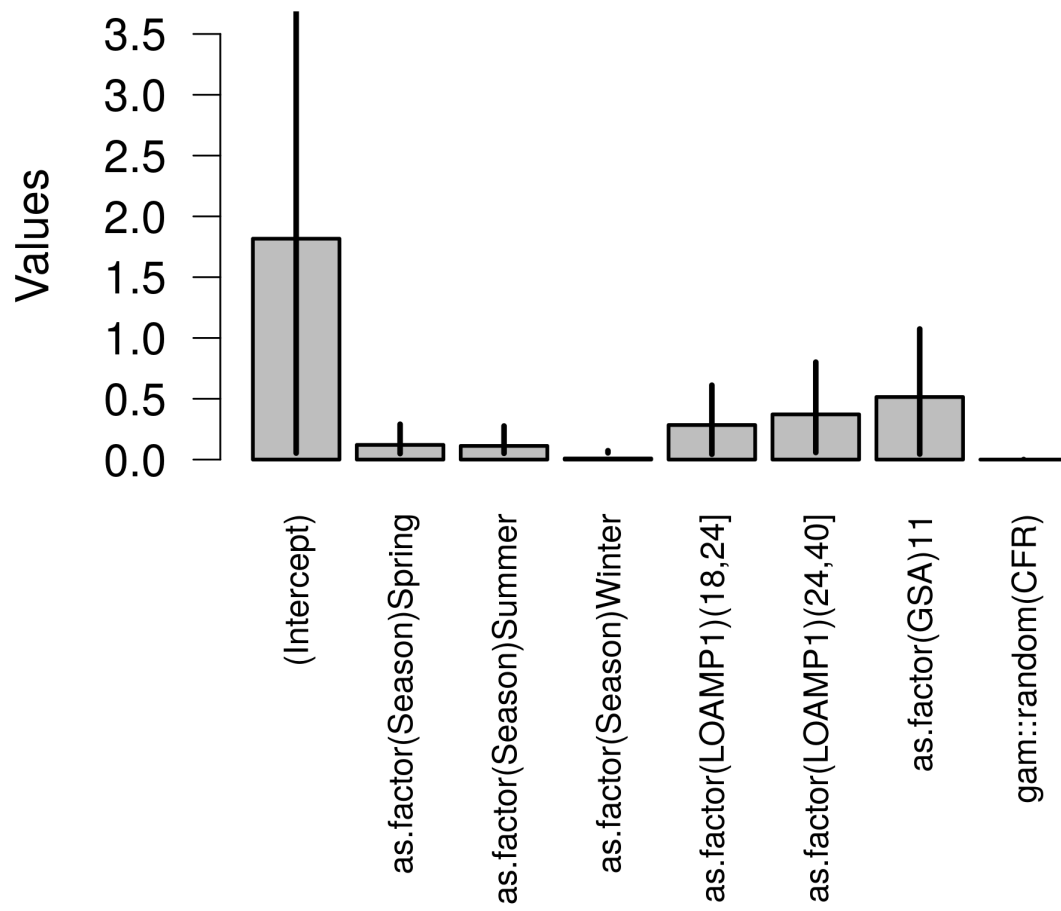


Figure 16: Estimates and related confidence intervals

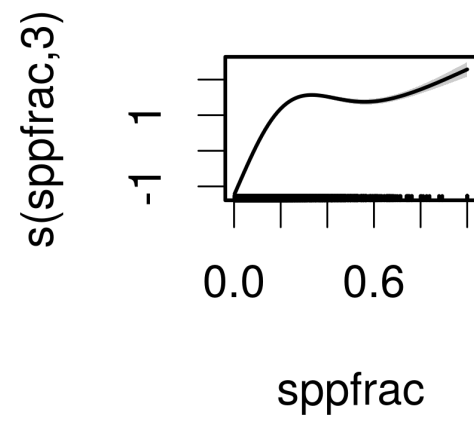
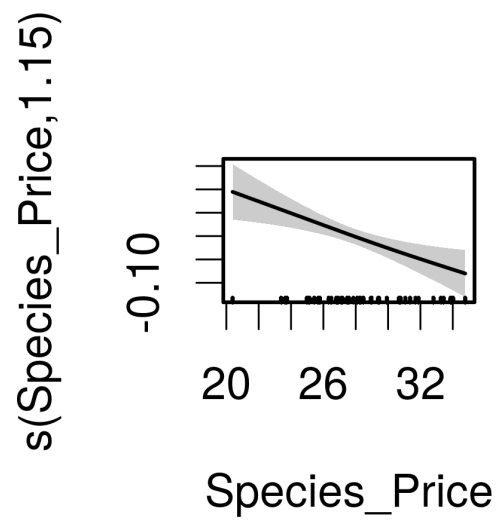
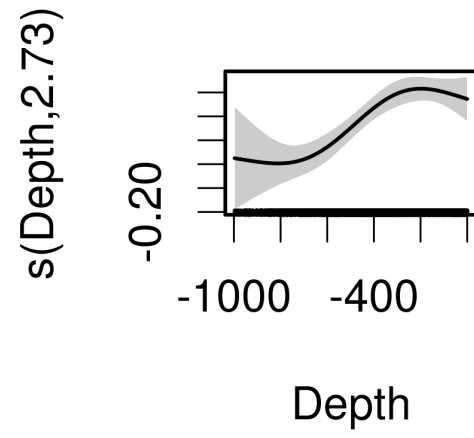
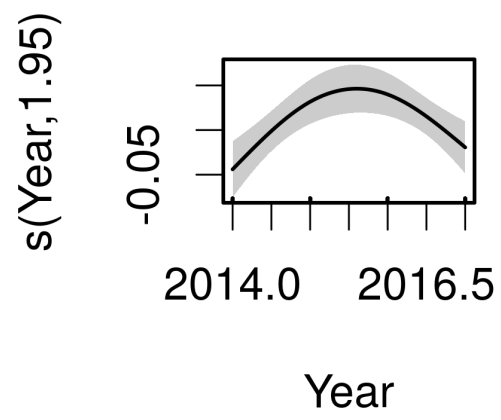


Figure 17: Smoothed effects



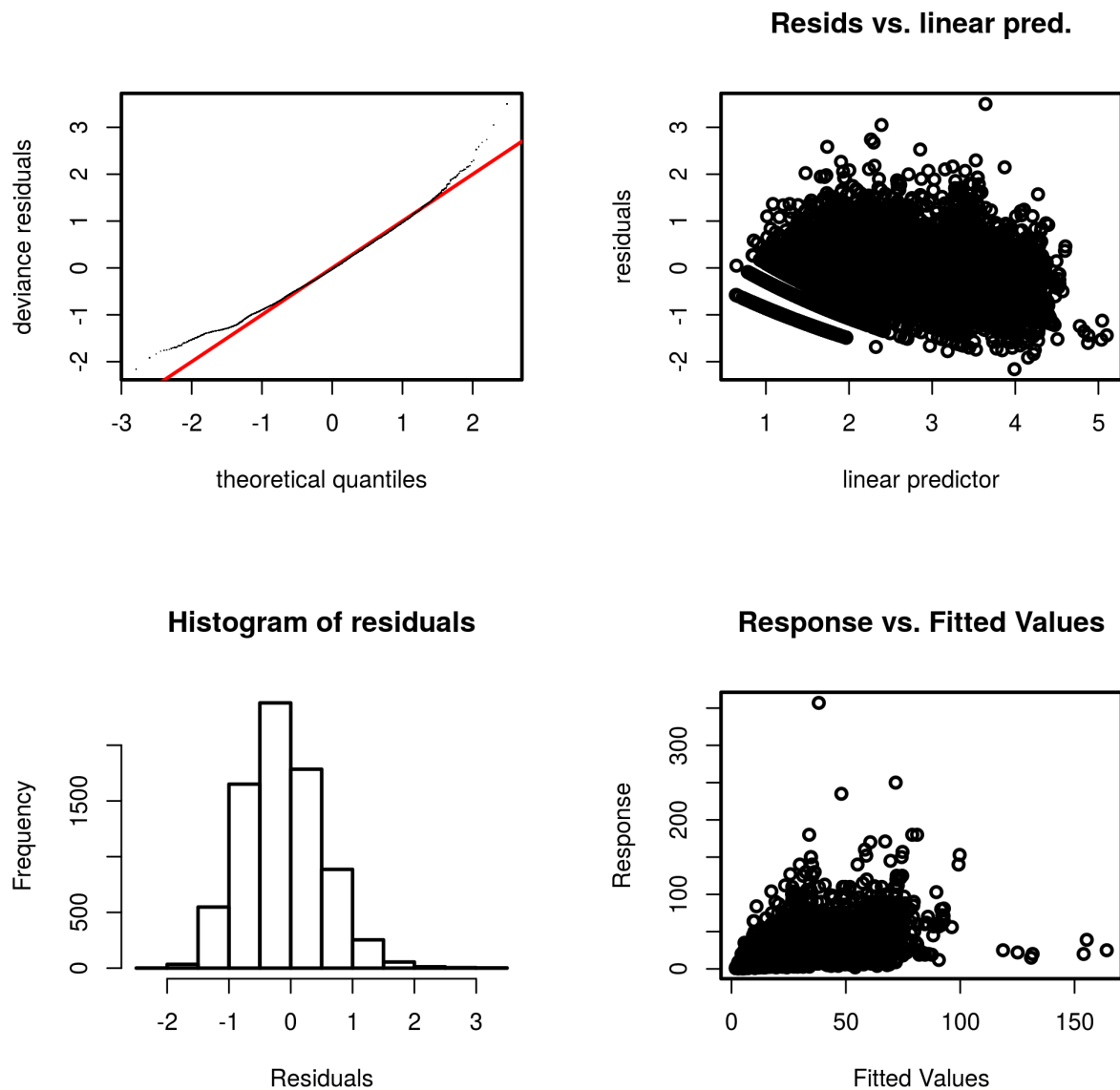


Figure 18: Diagnostics

```
##
## Method: REML   Optimizer: outer newton
## full convergence after 10 iterations.
## Gradient range [-0.001740201,0.002507723]
## (score 24812.16 & scale 0.4686068).
## Hessian positive definite, eigenvalue range [0.008708828,4293.326].
## Model rank =  18 / 19
##
## Basis dimension (k) checking results. Low p-value (k-index<1) may
## indicate that k is too low, especially if edf is close to k'.
##
##          k'   edf k-index p-value
## s(Year)      2.00 1.95   0.96   0.58
## s(Depth)     3.00 2.73   0.83 <2e-16 ***
## s(Species_Price) 3.00 1.15   0.95   0.26
## s(sppfrac)   3.00 3.00   0.72 <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

### 3) Catalonia

The model used for Catalonia was similar to the one used for Italy after removing the variables ‘Year’, the data referred to 2015 only, and ‘Species\_\_Price’, which were not available:

```
value ~ s(Depth, k = 4) + as.factor(Season) + as.factor(LOAMP1) +  
      s(sppfrac, k = 4) + as.factor(GSA) + gam::random(vesid)
```

Family: Gamma

Link function: log

where ‘LOAMP1’ are the lenght-over-all classes set in the MAP proposal ((0,12], (12,18], (18,24], (24,40]), ‘sppfrac’ is the fraction of the landings of the species, and ‘vesid’ is the vessel identifier anonymized.

### 3.1) Hake

The tables below show the coefficients estimated for each factor and smoother, including the information about potential statistical significance.

Table 13: Effects non-smoothers estimates

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	1.764	0.024	74.588	0.000
as.factor(Season)2	-0.133	0.015	-8.613	0.000
as.factor(Season)3	-0.015	0.016	-0.970	0.332
as.factor(Season)4	0.066	0.014	4.712	0.000
as.factor(LOAMP1)(12,18]	0.616	0.023	26.715	0.000
as.factor(LOAMP1)(18,24]	0.910	0.024	37.518	0.000
as.factor(LOAMP1)(24,40]	1.094	0.029	37.937	0.000
as.factor(GSA)2	0.433	0.119	3.631	0.000
gam::random(vesid)	0.000	0.000	NaN	NaN

Table 14: Smoothers estimates

	edf	Ref.df	F	p-value
s(Depth)	2.943	2.997	602.451	0
s(sppfrac)	2.998	3.000	8352.773	0

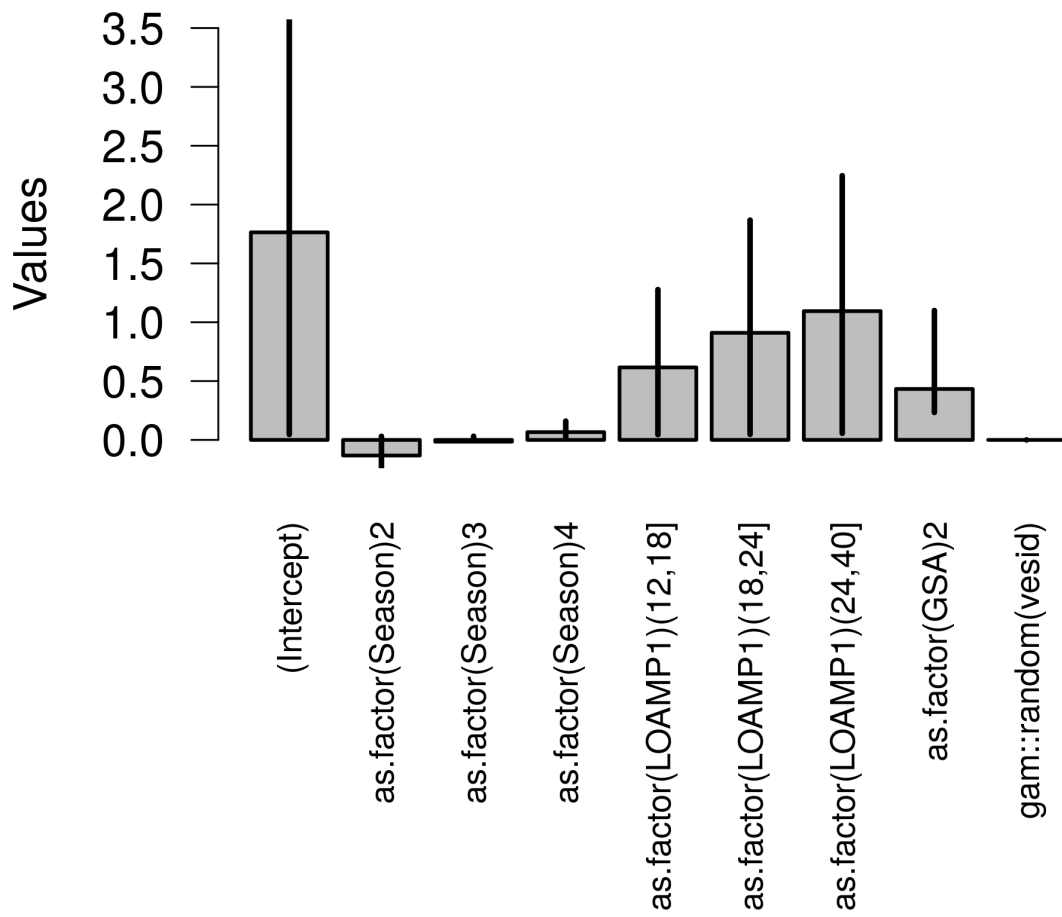


Figure 19: Estimates and related confidence intervals

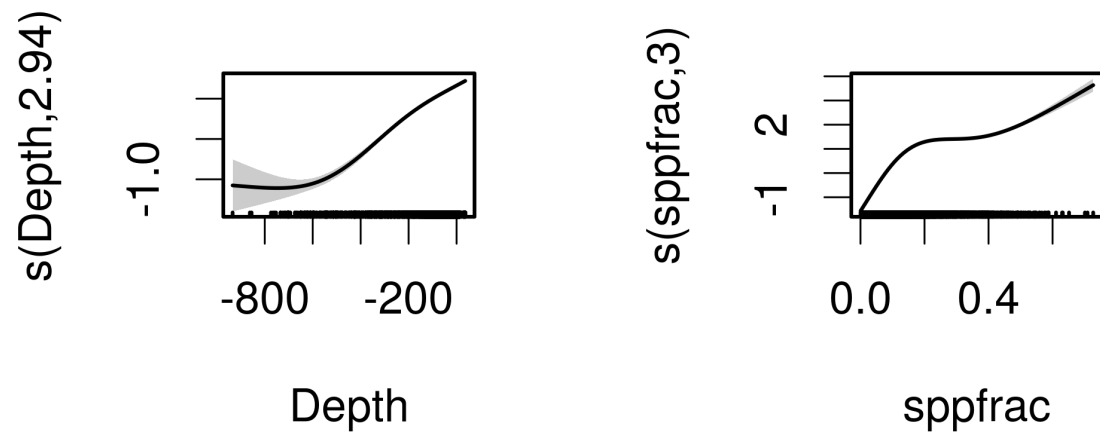


Figure 20: Smoothed effects

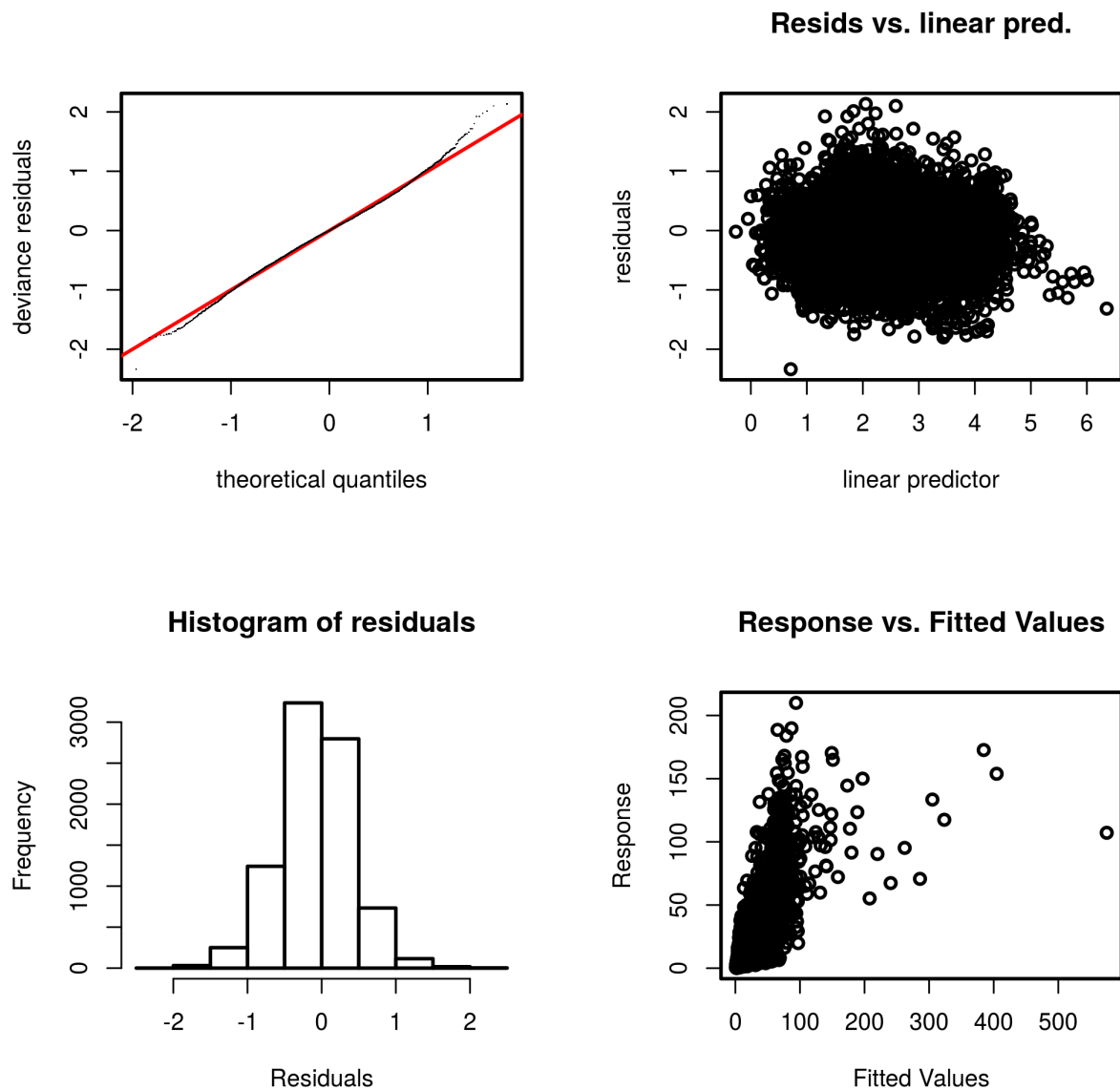


Figure 21: Diagnostics

```
##
## Method: GCV   Optimizer: outer newton
## full convergence after 12 iterations.
## Gradient range [5.712244e-09,2.033195e-07]
## (score 0.2417349 & scale 0.2372225).
## Hessian positive definite, eigenvalue range [1.154931e-07,3.299311e-06].
## Model rank = 14 / 15
##
## Basis dimension (k) checking results. Low p-value (k-index<1) may
## indicate that k is too low, especially if edf is close to k'.
##
##           k'   edf k-index p-value
## s(Depth)   3.00 2.94   0.85 <2e-16 ***
## s(sppfrac) 3.00 3.00   0.91 <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

### 3.2) Red mullet

The tables below show the coefficients estimated for each factor and smoother, including the information about potential statistical significance.

Table 15: Effects non-smoothers estimates

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	1.676	0.023	71.411	0.000
as.factor(Season)2	-0.096	0.019	-5.036	0.000
as.factor(Season)3	0.016	0.021	0.760	0.448
as.factor(Season)4	0.238	0.017	13.913	0.000
as.factor(LOAMP1)(12,18]	0.583	0.023	25.077	0.000
as.factor(LOAMP1)(18,24]	0.855	0.025	34.045	0.000
as.factor(LOAMP1)(24,40]	1.286	0.030	42.584	0.000
as.factor(GSA)2	0.547	0.146	3.746	0.000
gam::random(vesid)	0.000	0.000	NaN	NaN

Table 16: Smoothers estimates

	edf	Ref.df	F	p-value
s(Depth)	2.951	2.998	217.244	0
s(sppfrac)	2.997	3.000	4794.805	0

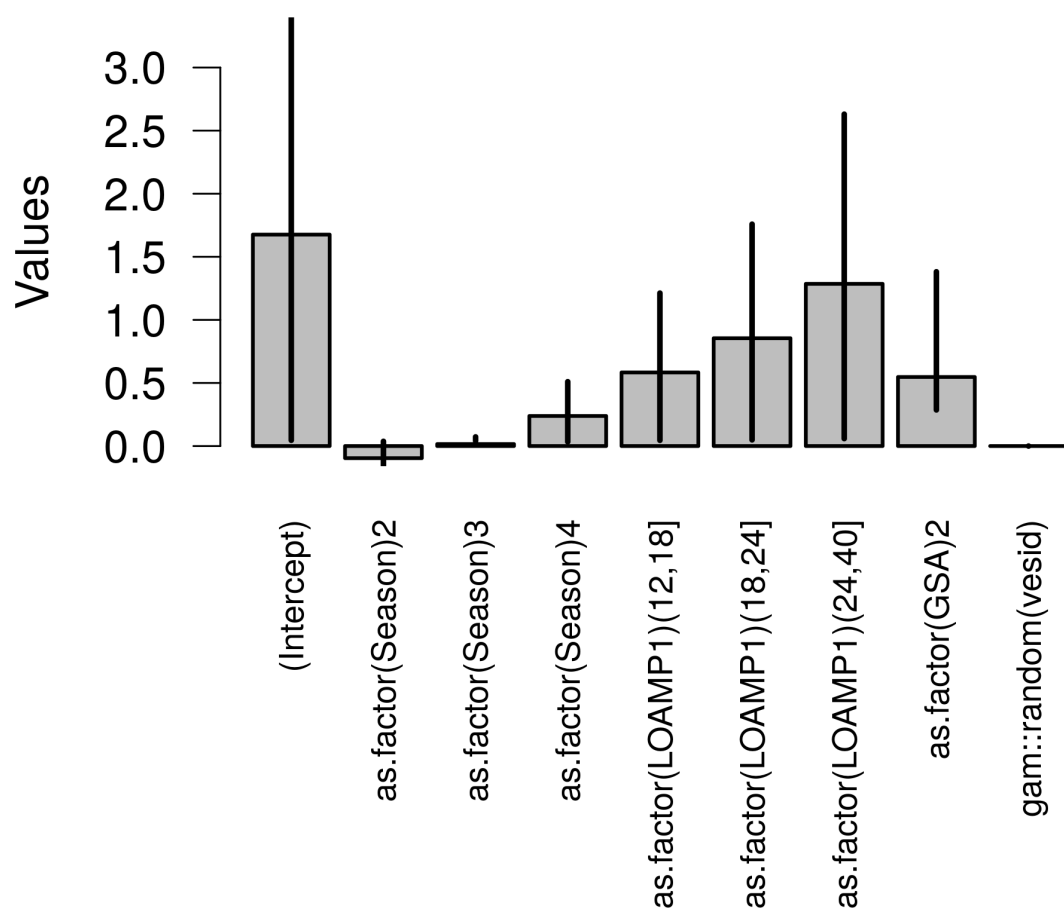


Figure 22: Estimates and related confidence intervals



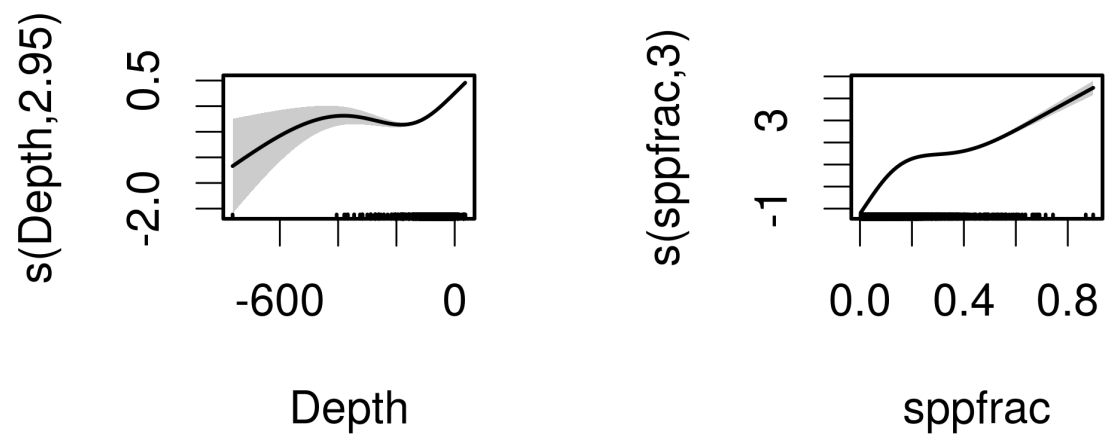


Figure 23: Smoothed effects

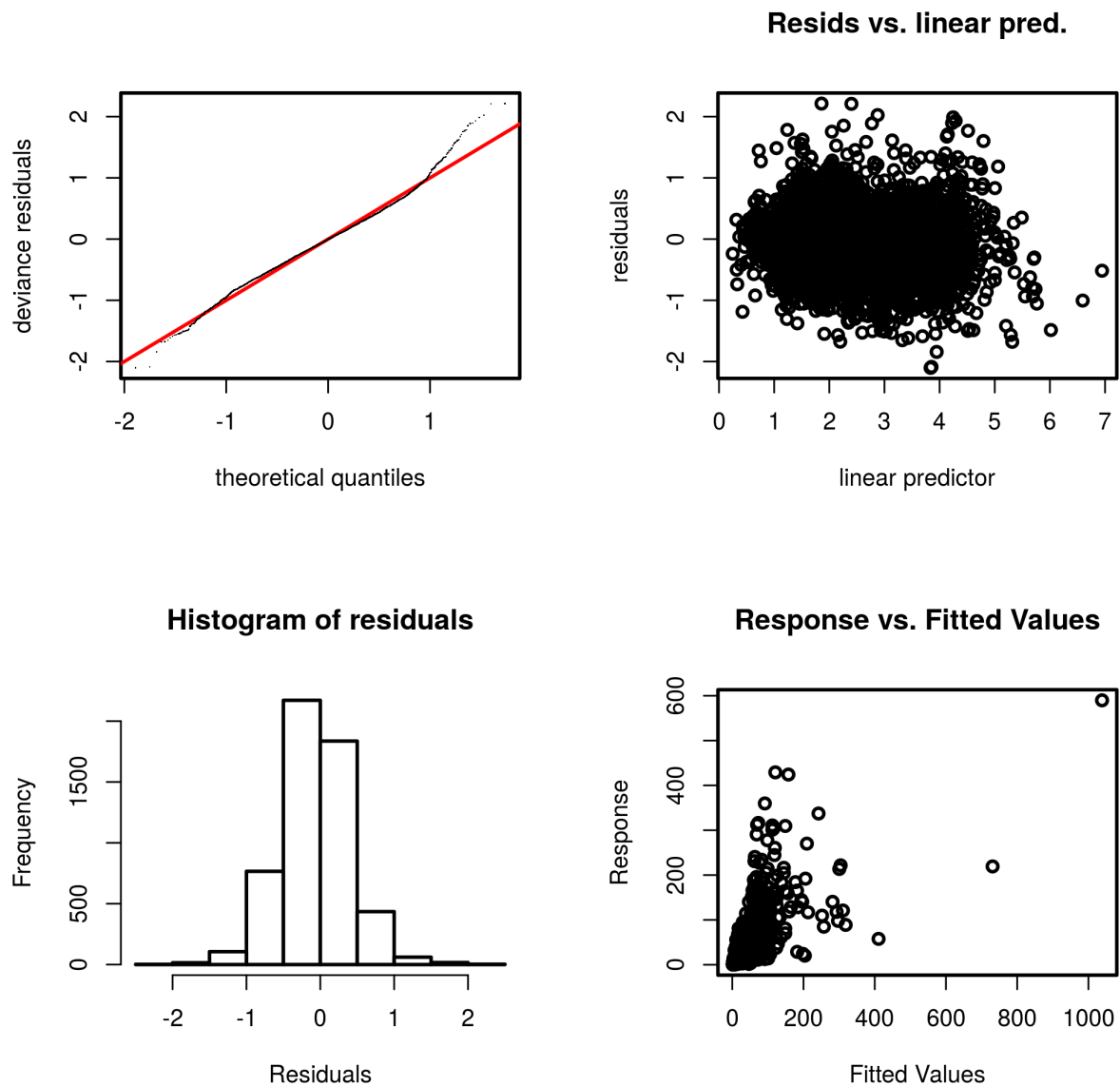


Figure 24: Diagnostics

```
##
## Method: GCV   Optimizer: outer newton
## full convergence after 7 iterations.
## Gradient range [8.108706e-08,2.003296e-07]
## (score 0.2203353 & scale 0.232402).
## Hessian positive definite, eigenvalue range [6.899762e-07,3.949443e-06].
## Model rank = 14 / 15
##
## Basis dimension (k) checking results. Low p-value (k-index<1) may
## indicate that k is too low, especially if edf is close to k'.
##
##          k'   edf k-index p-value
## s(Depth)  3.00 2.95   0.98   0.54
## s(sppfrac) 3.00 3.00   0.83 <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

### 3.3) Giant red shrimp

The tables below show the coefficients estimated for each factor and smoother, including the information about potential statistical significance.

Table 17: Effects non-smoothers estimates

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	0.490	0.049	10.044	0.000
as.factor(Season)2	-0.243	0.035	-7.025	0.000
as.factor(Season)3	-0.051	0.032	-1.598	0.110
as.factor(Season)4	0.156	0.030	5.270	0.000
as.factor(LOAMP1)(12,18]	0.521	0.048	10.963	0.000
as.factor(LOAMP1)(18,24]	0.863	0.048	17.853	0.000
as.factor(LOAMP1)(24,40]	1.057	0.060	17.600	0.000
as.factor(GSA)2	0.409	0.198	2.068	0.039
gam::random(vesid)	0.000	0.000	NaN	NaN

Table 18: Smoothers estimates

	edf	Ref.df	F	p-value
s(Depth)	2.928	2.996	48.320	0
s(sppfrac)	2.996	3.000	1631.125	0

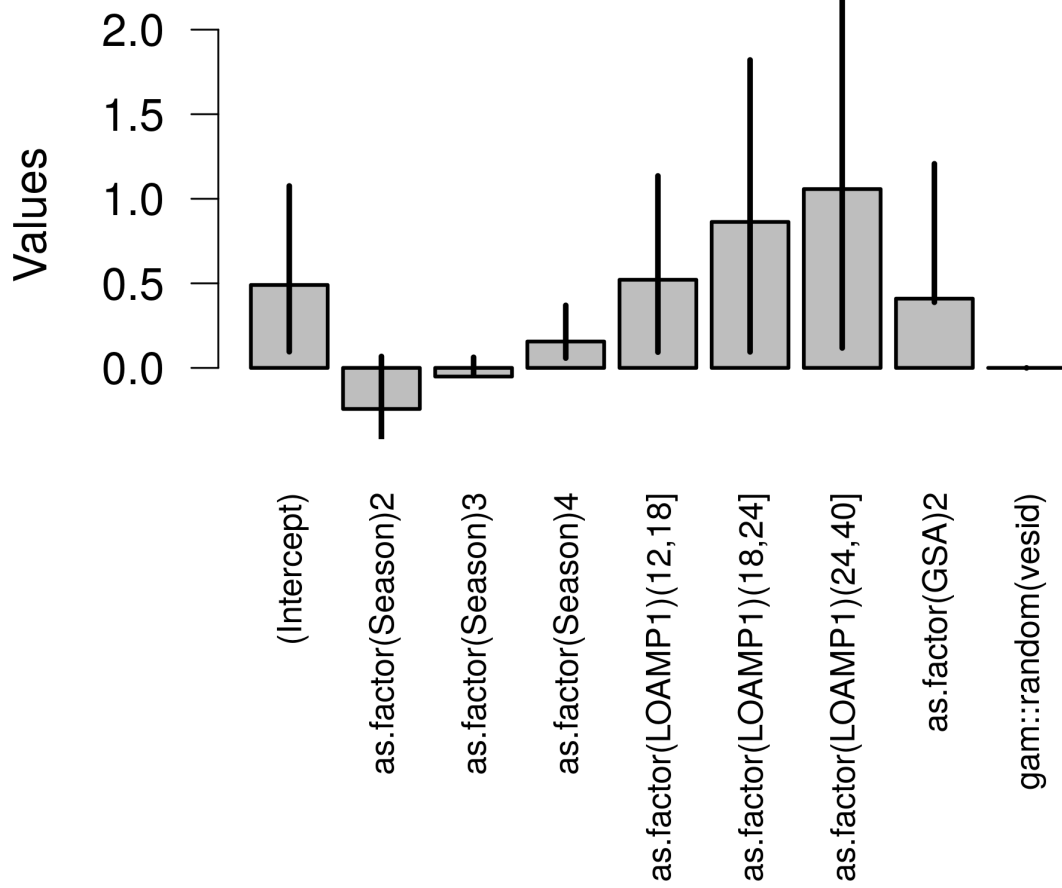


Figure 25: Estimates and related confidence intervals

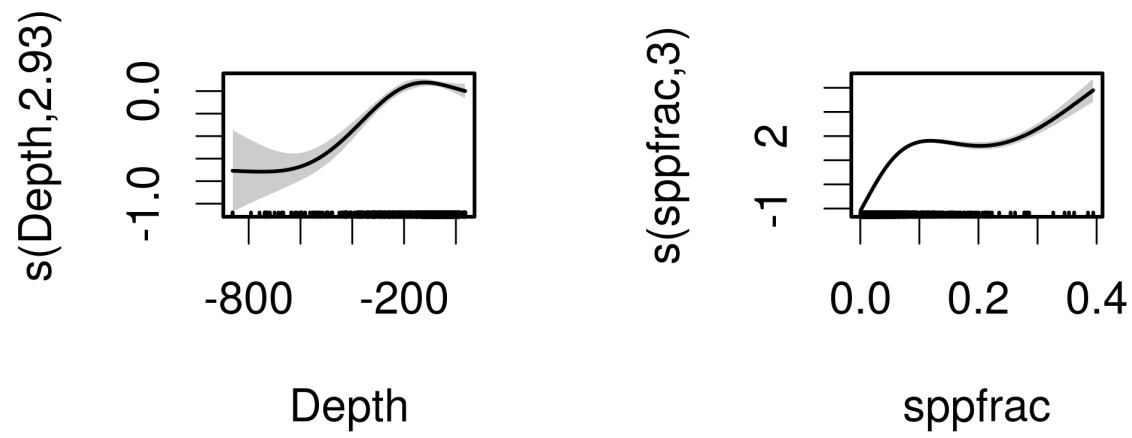


Figure 26: Smoothed effects

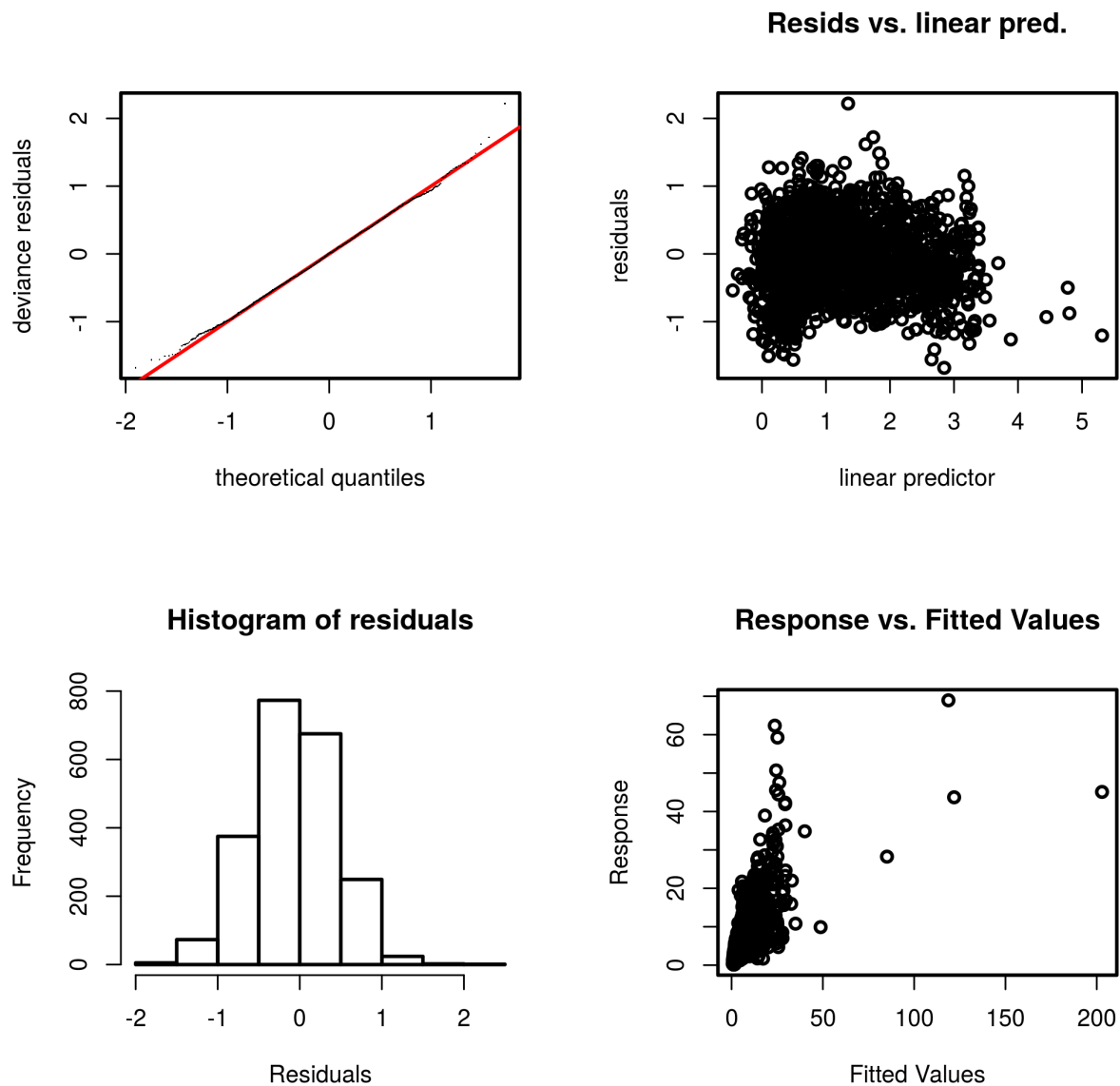


Figure 27: Diagnostics

```
##
## Method: GCV   Optimizer: outer newton
## full convergence after 6 iterations.
## Gradient range [-1.196307e-09,3.856498e-07]
## (score 0.2709023 & scale 0.2650132).
## Hessian positive definite, eigenvalue range [1.824075e-06,1.582964e-05].
## Model rank = 14 / 15
##
## Basis dimension (k) checking results. Low p-value (k-index<1) may
## indicate that k is too low, especially if edf is close to k'.
##
##          k'   edf k-index p-value
## s(Depth)  3.00 2.93   0.76 <2e-16 ***
## s(sppfrac) 3.00 3.00   0.70 <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

### 3.4) Blue and red shrimp

The tables below show the coefficients estimated for each factor and smoother, including the information about potential statistical significance.

Table 19: Effects non-smoothers estimates

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	3.117	0.109	28.627	0.000
as.factor(Season)2	0.445	0.057	7.844	0.000
as.factor(Season)3	0.293	0.052	5.675	0.000
as.factor(Season)4	0.113	0.054	2.111	0.035
as.factor(LOAMP1)(18,24]	0.047	0.104	0.453	0.651
as.factor(LOAMP1)(24,40]	0.609	0.104	5.867	0.000
as.factor(GSA)2	0.307	0.234	1.314	0.189
gam::random(vesid)	0.000	0.000	NaN	NaN

Table 20: Smoothers estimates

	edf	Ref.df	F	p-value
s(Depth)	1.001	1.001	8.127	0.004
s(sppfrac)	2.994	3.000	548.963	0.000

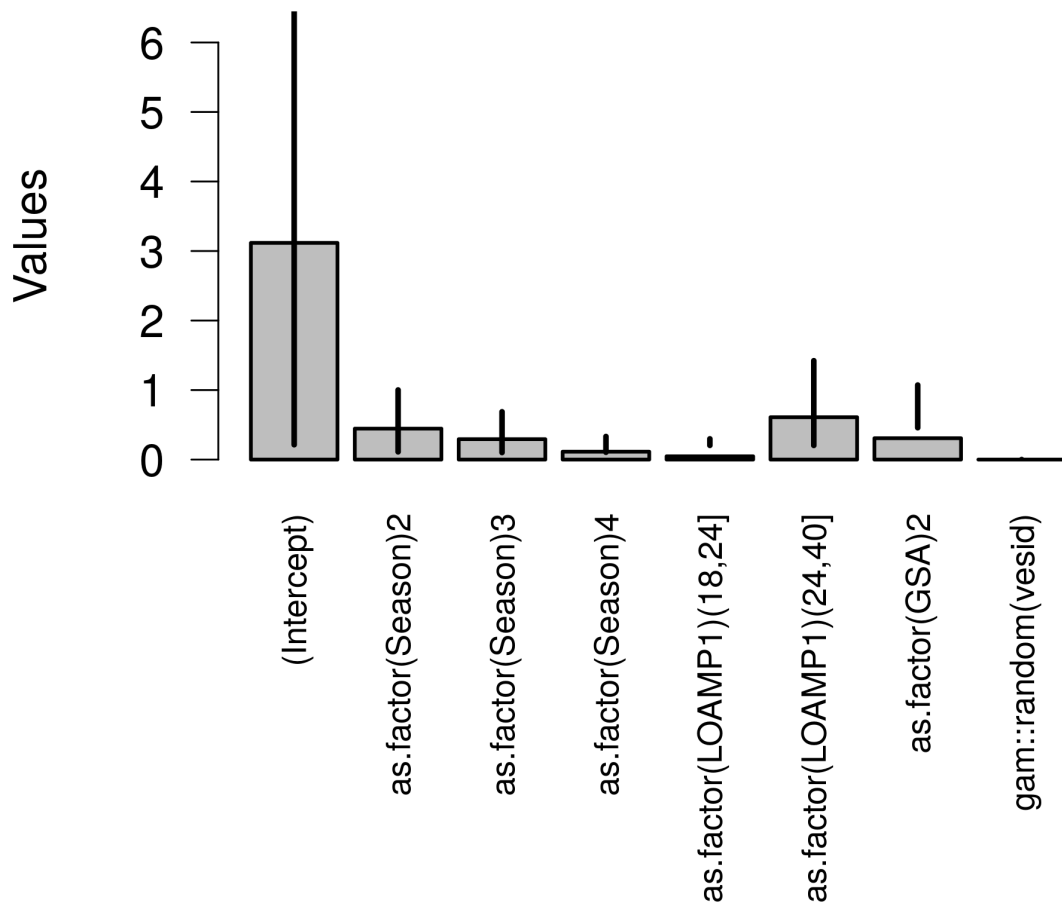


Figure 28: Estimates and related confidence intervals



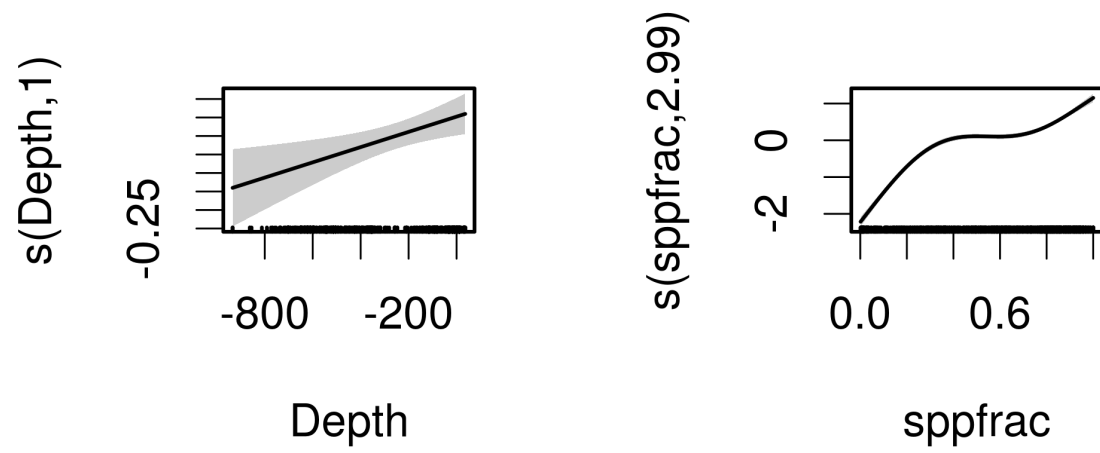


Figure 29: Smoothed effects

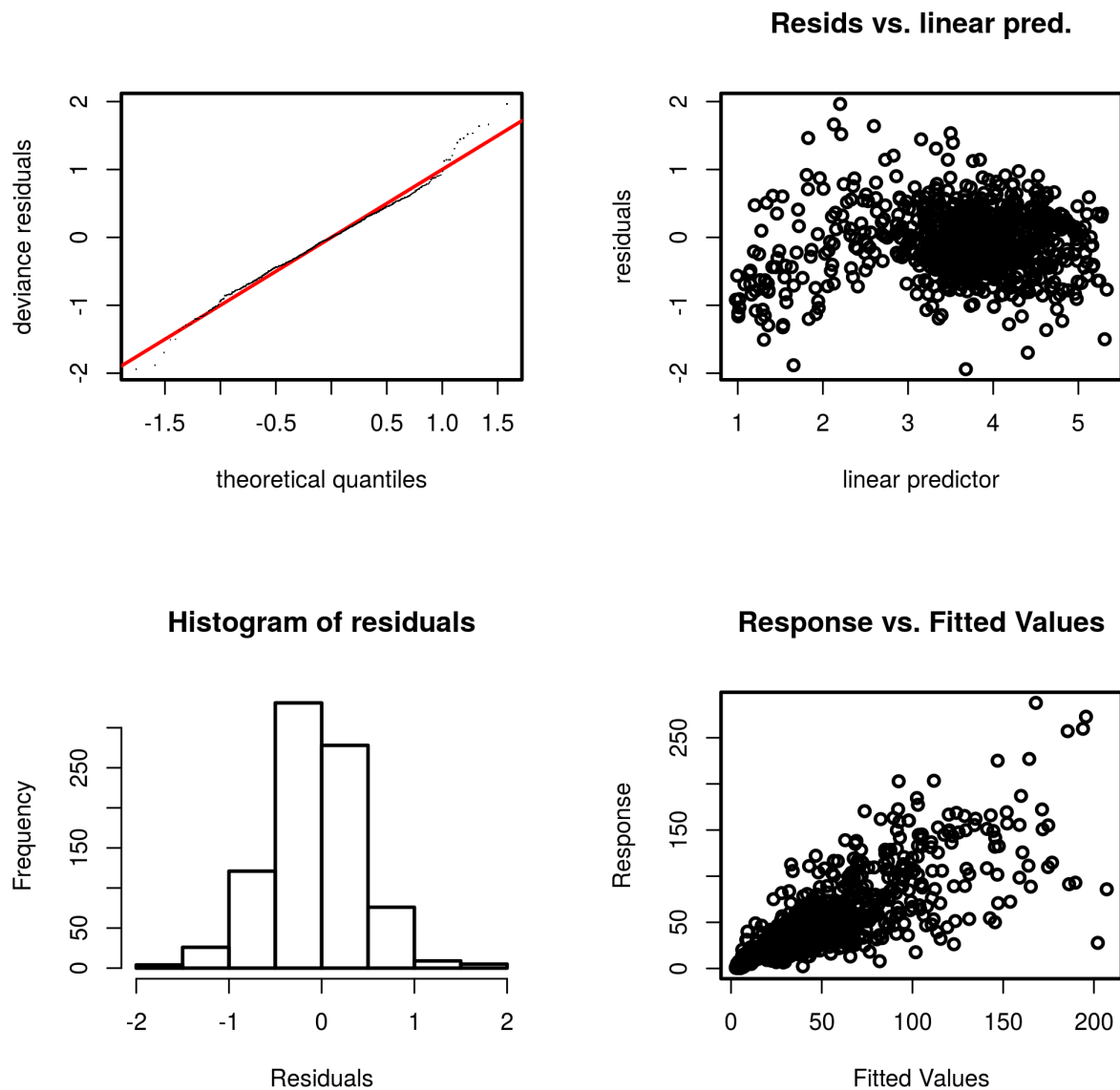


Figure 30: Diagnostics

```
##
## Method: GCV   Optimizer: outer newton
## full convergence after 7 iterations.
## Gradient range [-1.948072e-07,1.713697e-07]
## (score 0.2589882 & scale 0.2622373).
## Hessian positive definite, eigenvalue range [1.946666e-07,4.286724e-06].
## Model rank = 13 / 14
##
## Basis dimension (k) checking results. Low p-value (k-index<1) may
## indicate that k is too low, especially if edf is close to k'.
##
##          k'  edf k-index p-value
## s(Depth)  3.00 1.00   0.72 <2e-16 ***
## s(sppfrac) 3.00 2.99   0.74 <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

### 3.5) Norway lobster

The tables below show the coefficients estimated for each factor and smoother, including the information about potential statistical significance.

Table 21: Effects non-smoothers estimates

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	0.542	0.073	7.393	0.000
as.factor(Season)2	0.070	0.032	2.225	0.026
as.factor(Season)3	0.081	0.031	2.567	0.010
as.factor(Season)4	-0.180	0.034	-5.280	0.000
as.factor(LOAMP1)(12,18]	0.633	0.072	8.729	0.000
as.factor(LOAMP1)(18,24]	0.799	0.073	11.019	0.000
as.factor(LOAMP1)(24,40]	0.974	0.081	12.072	0.000
as.factor(GSA)2	0.466	0.252	1.849	0.065
gam::random(vesid)	0.000	0.000	NaN	NaN

Table 22: Smoothers estimates

	edf	Ref.df	F	p-value
s(Depth)	2.649	2.904	72.335	0
s(sppfrac)	2.999	3.000	2978.096	0

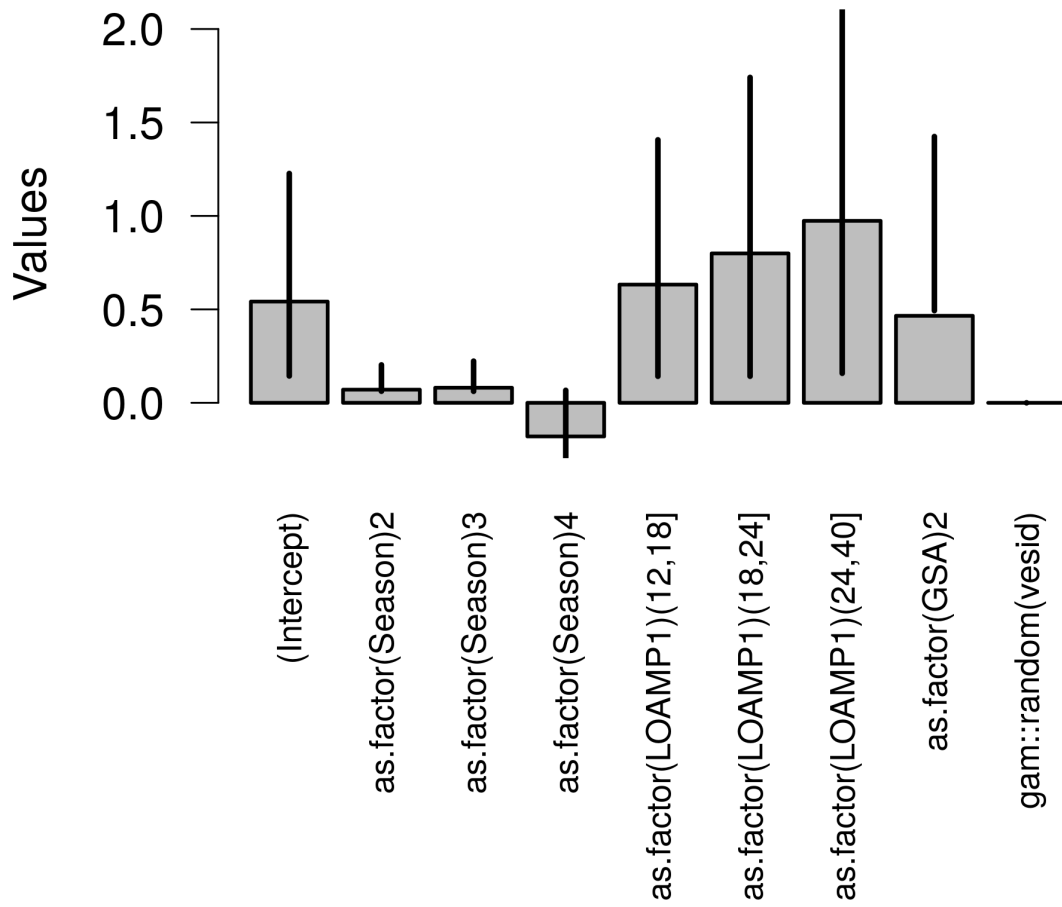


Figure 31: Estimates and related confidence intervals

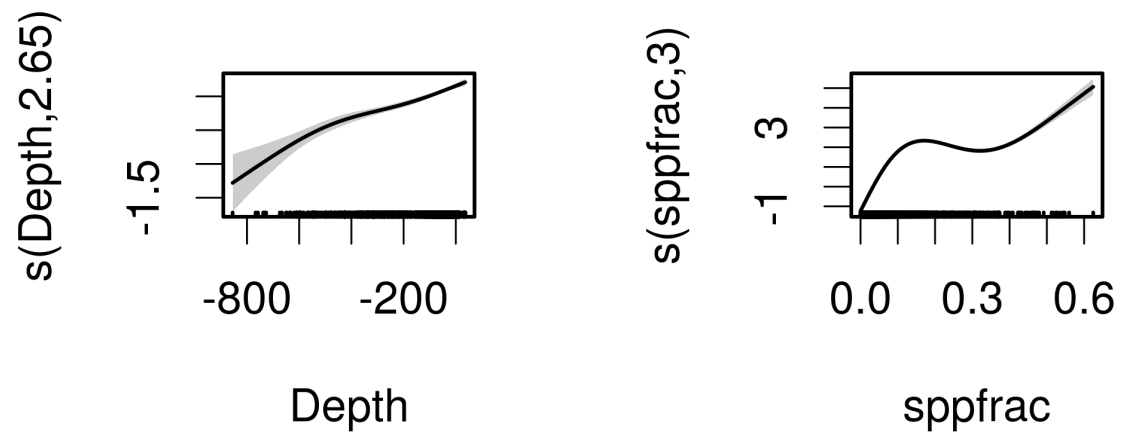


Figure 32: Smoothed effects

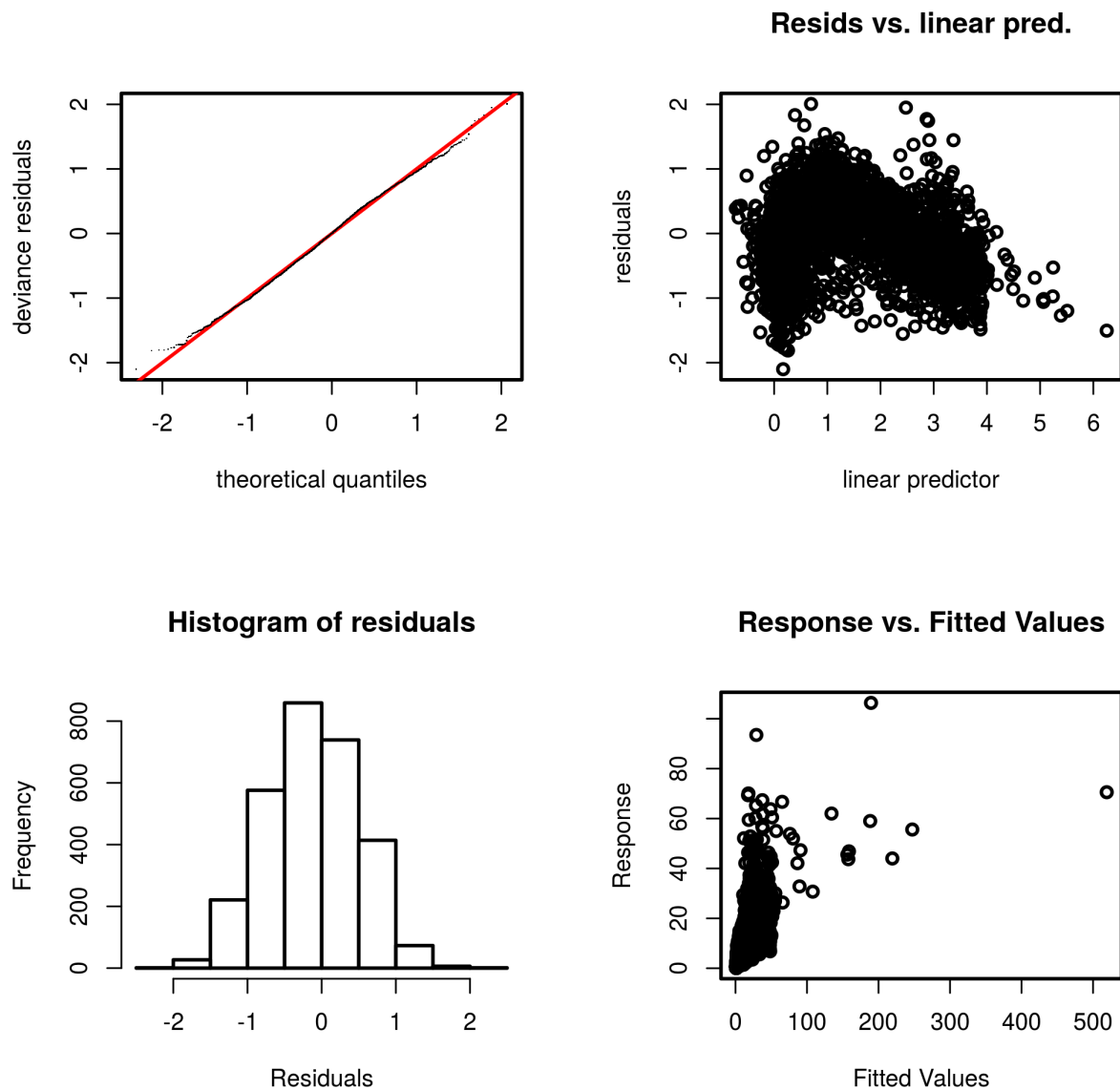


Figure 33: Diagnostics

```
##
## Method: GCV   Optimizer: outer newton
## full convergence after 8 iterations.
## Gradient range [8.847812e-08,1.573095e-07]
## (score 0.4008036 & scale 0.3678662).
## Hessian positive definite, eigenvalue range [3.43736e-07,4.822849e-05].
## Model rank = 14 / 15
##
## Basis dimension (k) checking results. Low p-value (k-index<1) may
## indicate that k is too low, especially if edf is close to k'.
##
##          k'   edf k-index p-value
## s(Depth)  3.00 2.65   0.78 <2e-16 ***
## s(sppfrac) 3.00 3.00   0.45 <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```