Proyecto Beetles

Mariona Pajares y Estefanía Tobajas

2022-09-21

We used the metadata collected in the Bavarian Forest National Park in southeastern Germany, dominated by sub alpine forests of Picea abies. In a dead wood zone caused by the 2011 super German storm, 150 different species were monitored.Sampling season was conducted between May and September over four years (2008-2011).

The years passed but, did the forest restoration methods improved beetles richness?

First, let's calculate species richness by sampling site and year

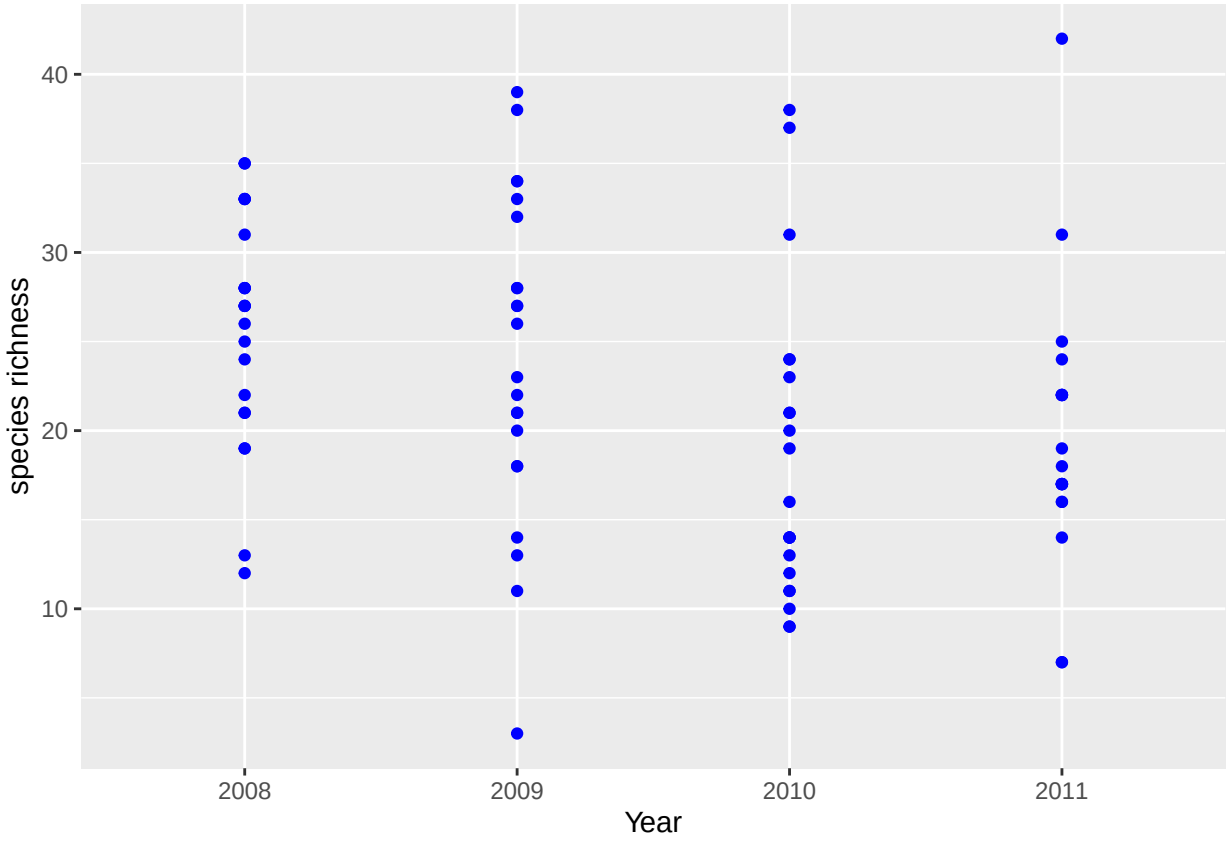
```
rawdata <- read.csv("datos/rawdata_bet.csv")
rawdata$YEAR<-as.factor(rawdata$YEAR)

bet_sum<-rawdata %>%
  group_by(PLOT, YEAR) %>%
  summarise(n_species = n(),ABUNDANCE = sum(ABUNDANCE))%>%
  rename(plot=PLOT, year=YEAR, abundance= ABUNDANCE)
```

plot	year	n_species	abundance
FAE_1	2008	12	52
FAE_11	2008	28	94
FAE_16	2008	27	125
FAE_18	2008	27	123
FAE_2	2008	28	115
FAE_21	2008	33	214
FAE_24	2008	21	104
FAE_3	2008	26	50
FAE_4	2008	19	51
FAE_7	2008	28	116
FAE_9	2008	35	119
FKN_1	2008	31	86
FKN_12	2008	19	41
FKN_14	2008	33	94
FKN_15	2008	35	136
FKN_4	2008	24	53

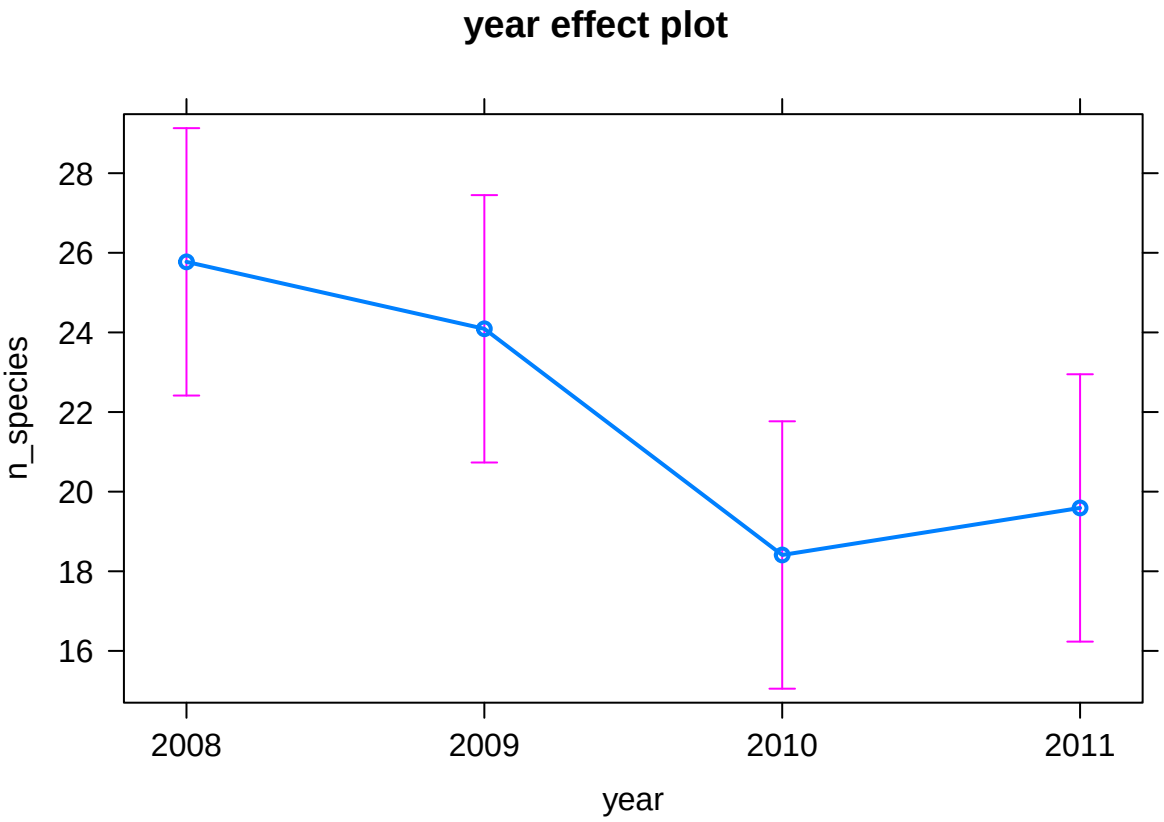
FKN_5	2008	27	103
FKO_4	2008	33	86
FKO_6	2008	25	65
LAO_3	2008	13	20
LAW_18	2008	21	89
LAW_5	2008	22	50

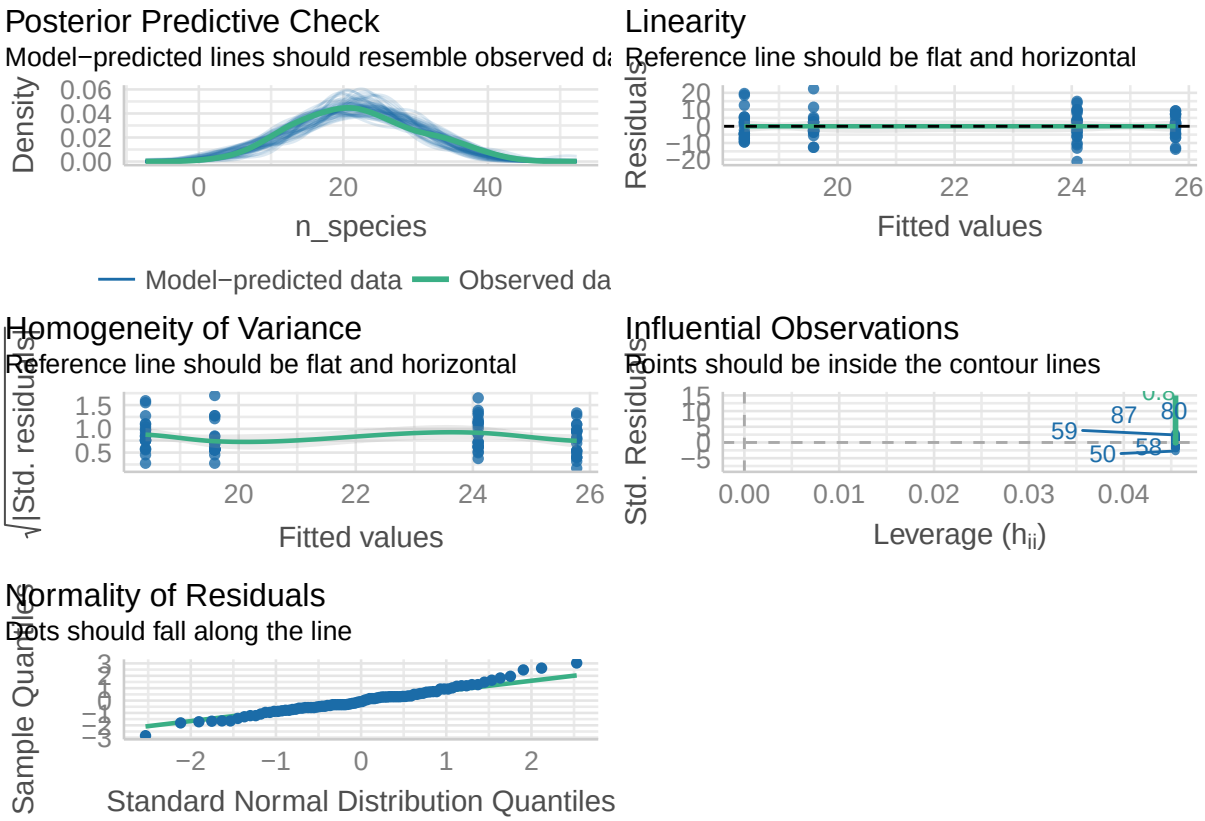
Second, plot that nice data



Is there any differences in species richness by year?

```
##
## Call:
## lm(formula = n_species ~ year, data = bet_sum)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -21.0909  -4.5000  -0.6818   4.0341  22.4091
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)   25.773      1.689  15.261  < 2e-16 ***
## year2009      -1.682      2.388  -0.704  0.48326
## year2010      -7.364      2.388  -3.083  0.00277 **
## year2011      -6.182      2.388  -2.588  0.01136 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 7.921 on 84 degrees of freedom
## Multiple R-squared:  0.1347, Adjusted R-squared:  0.1038
## F-statistic:  4.36 on 3 and 84 DF,  p-value: 0.006647
```


year effect plot
n_species
28
26
24
22
20
18
16
2008
2009
2010
2011
year


Posterior Predictive Check
Model−predicted lines should resemble observed da
Density
0.06
0.04
0.02
0.00
0
20
40
n_species
Model−predicted data
Observed da
Linearity
Reference line should be flat and horizontal
Residuals
20
10
0
−10
−20
20
22
24
26
Fitted values
Homogeneity of Variance
Reference line should be flat and horizontal
√|Std. residuals|
1.5
1.0
0.5
20
22
24
26
Fitted values
Influential Observations
Points should be inside the contour lines
Std. Residuals
15
10
5
0
−5
0.00
0.01
0.02
0.03
0.04
Leverage (hii)
59
87
80
50
58
Normality of Residuals
Dots should fall along the line
Sample Quantiles
3
2
1
0
−1
−2
−3
−2
−1
0
1
2
Standard Normal Distribution Quantiles