Wood-boring beetles

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The term woodboring beetle encompasses many species and families of beetles whose larval or adult forms eat and destroy wood (i.e., are xylophagous).In the woodworking industry, larval stages of some are sometimes referred to as woodworms. The three most speciose families of woodboring beetles are longhorn beetles, bark beetles and weevils, and metallic flat-headed borers. source

Wood density and the saprophytic wood boring beetle

Saint Germain et al. (2007) modeled the presence absence of a saprophytic wood boring beetle (*Anthophylax attenuatus*) as a function of the wood density of twenty-four decaying aspen trees (*Populus tremuloides*) in Western Quebec Canada

Data

The data contains the following 4 variables

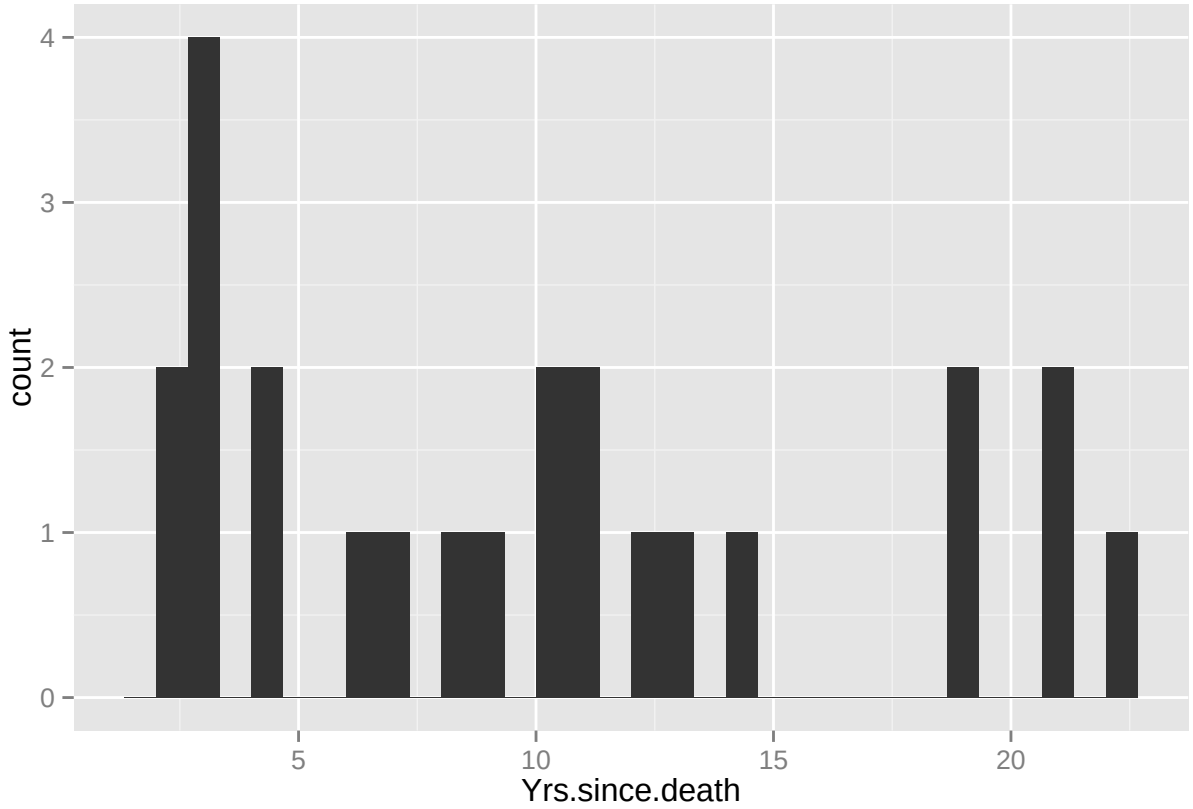
- **Snag** — Snag identifier
- **Yrs.since.death** — The number of years since death, determined using dendrochronological methods
- **Wood.density** — The density of the decaying wood (dryweight/volume) in units of g cm^3
- **ANAT** — Beetle presence/absence (1/0)

The data set contains 24 observations. The mean wood density is 0.2806667. The beetle is present in 15 cases.

Here you see a summary of the data:

Snag	Yrs.since.death	Wood.density	ANAT
Min. : 1.00	Min. : 2.000	Min. :0.1750	Min. :0.000
1st Qu.: 6.75	1st Qu.: 3.750	1st Qu.:0.2357	1st Qu.:0.000
Median :12.50	Median : 9.500	Median :0.2790	Median :1.000
Mean :12.50	Mean : 9.875	Mean :0.2807	Mean :0.625
3rd Qu.:18.25	3rd Qu.:13.250	3rd Qu.:0.3187	3rd Qu.:1.000
Max. :24.00	Max. :22.000	Max. :0.4050	Max. :1.000

Distribution of Year since death



Generalized Linear Model

We model presence/absence as a function of wood density using the **glm()** function

```
m.log <- glm(ANAT ~ Wood.density, family = "binomial",data = beetle)
pander(m.log)
```

Table 2: Fitting generalized (binomial/logit) linear model: ANAT ~ Wood.density

	Estimate	Std. Error	z value	Pr(>|z|)
Wood.density	-52.63	23.84	-2.208	0.02725
(Intercept)	15.66	6.856	2.284	0.02238

Effects

We use the **allEffects** command out of the **effects** package to transform the effects to the probability scale:

```
## Loading required package: effects
```

```
##  model: ANAT ~ Wood.density
```

```
##
##  Wood.density effect
## Wood.density
##         0.2        0.25         0.3        0.35         0.4
## 0.994131440 0.924189118 0.467319078 0.059384817 0.004522846
```

Visualization