Harbor seals analysis

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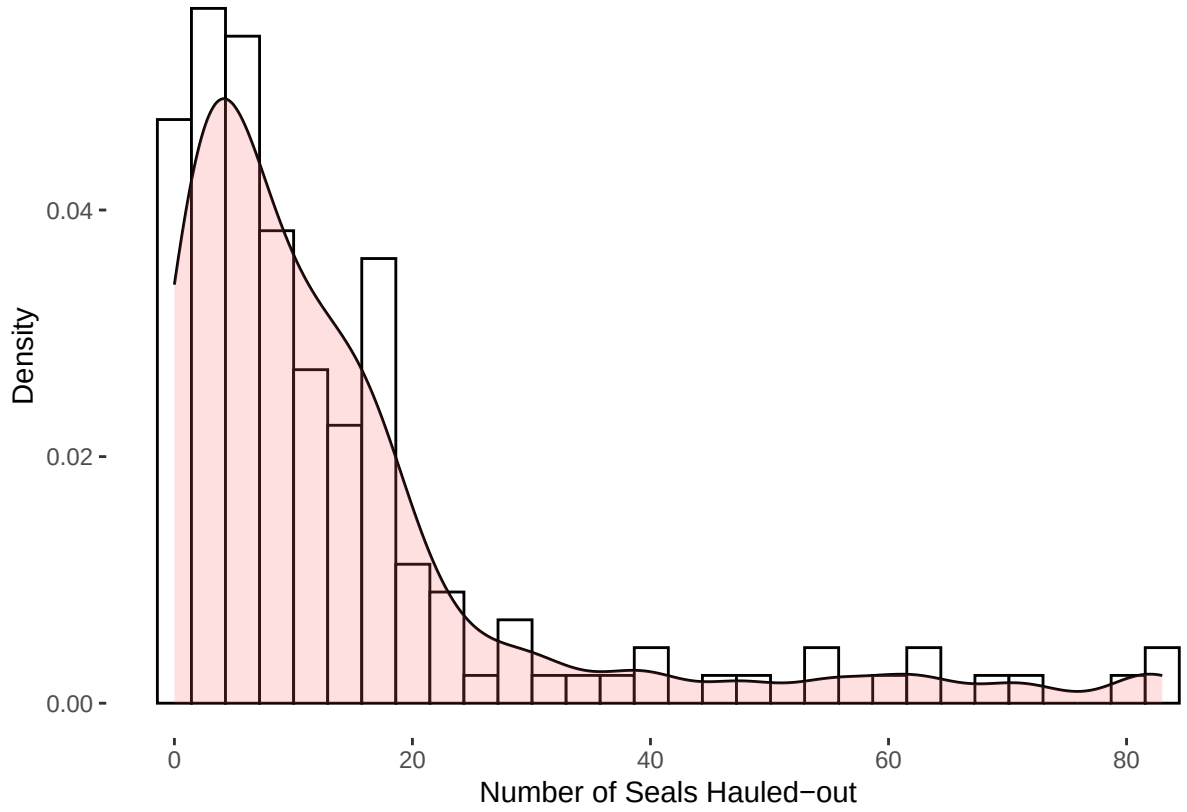
Waterfront-Marina GLM analysis

In this markdown I will:

1. Find the best distribution to use for GLMs.
2. Run GLMS and AICs to find the most appropriate model and predictors.
3. Create visualization graphs for each site.

Check Histogram



A negative binomial model would fit this data best.

Create GLMs and find best model with AICc

To test whether noise affects the number of seals hauled-out by site, I will insert an interaction between noise level and site.

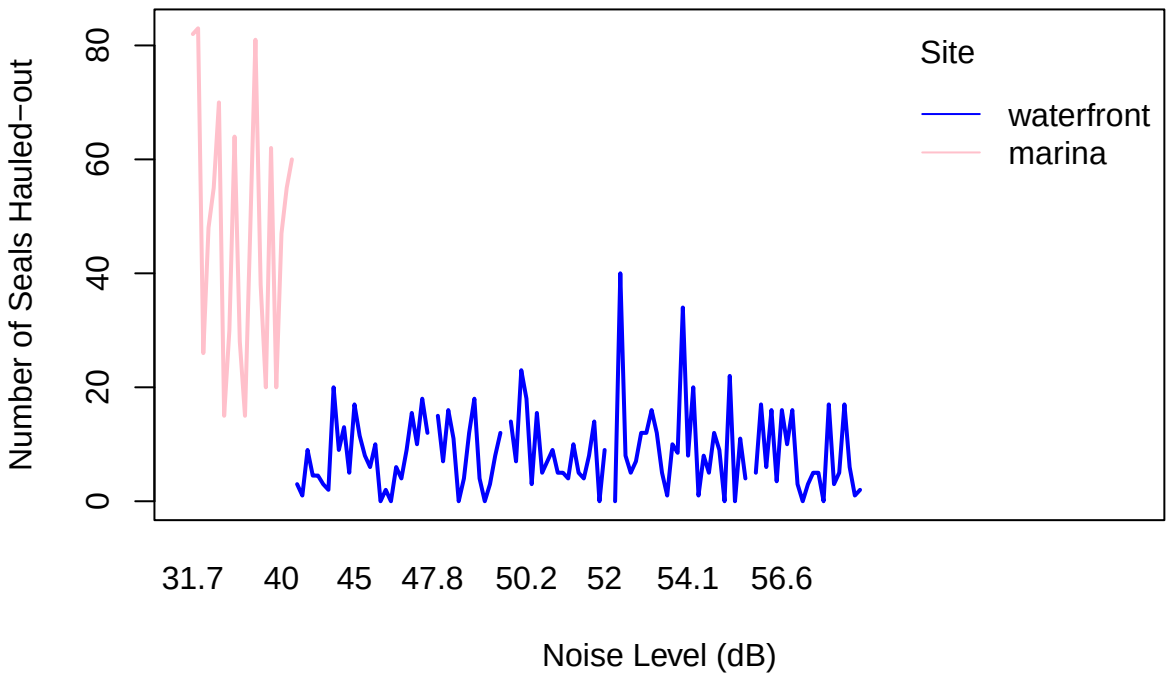
```
## Loading required package: MASS
```

```
##                                           N df     AICc
## seals ~ 1                                 155  2 1143.696
## seals ~ site*noise + month + tide + time 155  8 1061.879
## seals ~ site*noise + month + time        155  7 1060.031
## seals ~ site*noise + month               155  6 1062.170
```

Looks like the best model will contain month, noise, site and time as predictors. This is the summary of that model:

```
##
## Call:
## glm.nb(formula = seals ~ site * noise + month + time, data = full.data,
##     init.theta = 1.738579161, link = log)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.9338  -0.8665  -0.1937   0.4408   2.4225
##
## Coefficients:
##                       Estimate Std. Error z value Pr(>|z|)
## (Intercept)           8.31830    1.07277   7.754 8.90e-15 ***
## sitewaterfront       -3.62238    1.25922  -2.877  0.00402 **
## noise                -0.06368    0.02554  -2.493  0.01266 *
## month                -0.18974    0.04597  -4.127 3.67e-05 ***
## time                 -0.05820    0.02795  -2.082  0.03733 *
## sitewaterfront:noise  0.05995    0.02923   2.051  0.04028 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for Negative Binomial(1.7386) family taken to be 1)
##
##     Null deviance: 319.08  on 154  degrees of freedom
## Residual deviance: 183.65  on 149  degrees of freedom
## AIC: 1059.3
##
## Number of Fisher Scoring iterations: 1
##
##
##               Theta:  1.739
##           Std. Err.:  0.250
##
##  2 x log-likelihood:  -1045.269
```

- Month and time are significant predictors for how many harbor seals haul-out.
- Site and noise are significant predictors for the number of harbor seals hauled-out. The effect of noise on the number of seals haul-out depends on what site they are located in.


Number of Seals Hauled−out
0
20
40
60
80
Site
waterfront
marina
31.7
40
45
47.8
50.2
52
54.1
56.6
Noise Level (dB)