

This document presents detailed results for all non-simulation analyses, focusing on linear model output and diagnostics.

```
library(mgcv)      # v 1.8-17 - gam
library(regr0)     # v 1.0-5 - logst
library(lattice)
library(Hmisc)
library(ggplot2)
library(cowplot)
```

Note on transformations: We use the *logst* function in the *regr0* package to log-transform our data when necessary. This function is equivalent to a \log_{10} transformation for all but the smallest values, which are scaled such that the transformation yields finite values (e.g. because $\log_{10}(0)$ is undefined). We chose this option because, unlike adding an arbitrary constant value of 1 to all observations, this method of scaling small values is determined by the distribution of the data, and importantly it only modifies the smallest observations, leaving all others unchanged.

Peak effects

The following models include one data point for each continuous period of illumination or darkness: the maximum value observed during that period.

Standardized peak density

Standardized peak density is defined as:

$$\frac{\max(\eta_{0-0.5km}) - \text{mean}(\eta_{2-20km})}{sd(\eta_{2-20km})}$$

Where $\eta_{0-0.5km}$ is the set of bird density values within 0.5 km of the Tribute and η_{2-20km} is the set of bird density values between 2-20 km from the Tribute.

In all cases, we compare three models with the following parametric effects using AIC:

1. *light* + *year* + *light* × *year*
2. *light* + *year*
3. *light*

Here, *light* is a two-level categorical variable describing whether the Tribute was illuminated or not, and *year* is a four-level categorical variable describing the year in which that observation occurred.

We used the model with the lowest AIC score, unless there was a difference of less than 1 AIC unit separating the models. In this case, we used the model with the fewest parametric effects.

0.5° elevation angle

```
m1 = gam(logst(val)~light*year,data=light.df.g %>% filter(elev==1 & the.type=="max.peak.std"))
m2 = gam(logst(val)~light+year,data=light.df.g %>% filter(elev==1 & the.type=="max.peak.std"))
m3 = gam(logst(val)~light,data=light.df.g %>% filter(elev==1 & the.type=="max.peak.std"))
AIC(m1,m2,m3)
```