Reading Questions- Week 4

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Question 1: For both models (abundance and presence/absence) identify: The predictor variable(s) and the data type/scale used for the predictor variable.

In example 1, the predictor variable is the extent of late-successional forest which is a continuous quantitative measurement on a ratio scale (cannot have less than 0% cover of a forest type). In example 2, the predictor variable is the total basal area of trees in the sample plots, which is also a continuous quantitative measurement on a ratio scale.

Question 2: For both models (abundance and presence/absence) identify the response variable(s) and the data type/scale used for the response variable.

In example 1, the response variable is the brown creeper relative abundance measured on a continuous numeric scale from 0 to 1. Since it is a relative abundance value, it can not drop below zero and therefore is on a ratio scale as well. In example 2, the response variable is the presence/absence of brown creepers on a site. Presence/absence data is on a discrete scale (either 1 or 0) that is numeric (1 can be logically ordered higher than 0) and ratio-based (no values below 0 are used).

Question 3: For both models, how did the data type or scale influence or constrain the choice of model?

For example 1, both variables were on a continuous scale which allowed a scatterplot to be used to identify trends in the data. A linear model fits this type of data nicely as every x value on a continuous scale can have a corresponding y value on a continuous scale. Example 2 had a mix of continuous data (the predictor variable) and discrete data (the response variable) which prevented a linear model from fitting the data nicely. Linear models won’t fit presence/absence data well as every x value on a continuous scale can only correspond to one of two y values (either a 0 or 1). Instead, McGarigal decided to fit a logistic model to the data as it is inherently good at fitting binary data.

Question 4: A) What are the pros and cons of the Ricker model? B) What are the pros and cons of the quadratic model?

The Ricker model and quadratic models both fit the dataset well, but there are advantages and disadvantages to each. With the Ricker model, we can understand the fit of the data to the model because there is an underlying mechanistic reason for why the model fits (and therefore we can choose this model a priori). The con with the Ricker model is that the data doesn’t fit exactly, which is to be expected when you’re working with biological data. The quadratic model on the other hand fits the data extremely well because you can keep adding more terms to make the model fit perfectly to the data. The con with quadratic models is that there’s no underlying mechanism behind the model and therefore it is difficult to gain any insight into the natural phenomena at hand.