Hazel Ortiz

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ECO 602

Week 4 Reading Questions

McGarigal presented two studies of Brown creepers:

* A model of Brown creeper abundance explained by late-successional forest percent.
* A model of Brown creeper presence/absence explained total basal area (a measure of tree cover).

**Q1: For both models (abundance and presence/absence) identify:**

1. **The predictor variable(s).**

For the first model, I believe that forest succession percent since the forest succession percentage determines the response of the brown creeper abundance.

For the second model, I believe the total basal area is the predictor variable. The total basal area is not manipulated and observed naturally like the first model and seems to determine the response of the other variable.

1. **The data type/scale used for the *predictor* variable**

**First model:** Forest succession percent I think is on a Quantitative scale and a continuous type

**Second model:** Total basal area I think is on a Quantitative scale and a continuous type

**Q2: For both models (abundance and presence/absence) identify:**

1. **The response variable.**

I believe the response variable for the first model is the brown creeper abundance since the brown creeper numbers are the variable that is responding to the values of the other variable, forest succession percentage.

For the second model, the presence/absence of the brown creeper is the response variable. Brown creeper presence/ absence is the variable that is of interest and is responsive to the predictor variable in which its numbers increase.

1. **The data type/scale used for the *response* variable.**

First model: Relative abundance of brown creepers is on a Qualitative scale and a continuous data type.

Second model: The presence/absence of Brown creeper is on the Qualitative data scale since it is binary data type.

**Q3: For both models: How did the data type or scale influence or constrain the choice of model?**

The data type had a major influence in the choice of model. For example, the second model was constrained to display the data as a logistical model due to the response variable being binary. I would say with this model it was a bit difficult for me personally to see the relationship of the variables, however, I thought the relationship was shown better in this model in comparison to the first model. In the first model they used a linear model due to the increase of the brown creeper in relation to the percentage of forest succession. Even though the data does increase in a linear pattern, the data is variable, so I don’t think it does the best job at showing the relationship.

Q4: What are the pros and cons of the Ricker model?

Pro:

* + It is a rational function, so they are flexible and easy to compute.
  + Can have a mechanistic interpretation from simple biological process models
  + Also widely used as a phenomenological model for environmental variables (start at zero, increase to a peak, then decrease to zero)
  + Generally popular

Cons:

* + Can be complicated to analyze
  + Estimating the asymptote can be difficult since they are approached slowly

Q5: What are the pros and cons of the quadratic model?

Pro:

* + A polynomial function which are most common and familiar
  + Widespread use
  + Easy to understand and highly flexible in describing linear and curvilinear patterns
  + Involve power laws: power parameters can be added to an existing model and can allow for changes of scale, location, and curvature

Cons:

* + Polynomial parameters are rarely derived from environmental theory so hard to justify mechanistically
  + Easy to over fit data with higher order polynomials
  + Not recommended to use polynomials higher than cubic