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Analysis of Environmental Data Lecture

Week 2 Reading Questions

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Worked with Doug Bishop and Julia Vineyard

1. Dichotomies

Dichotomy is when you have two options of approach in statistical modeling design. It can be dealing with scope and approach, technical details, or in the sophistication. For my research with black bears, I assume I will be using an applied model. This is because I am taking current black bear resource and habitat selection data and predicting how, with the continuous urbanization of Massachusetts, black bears will continue to adapt to limited natural resources. I will be using data from discrete individuals, all of which are radio collared, mature, female black bears. With my basic knowledge of statistical analysis, I assume I will be running simple models to calculate my results.

2. Assumptions and Biases

I believe one assumption from the public about science stems from field of study. It is easier for the public to accept results of a study performed in a lab setting. This is definitely a cultural thing. For ecologists, many results and protocols are typically more flexible because of the large scale of the study and the timeline in which these studies take place. For example, it is easy for a non-scientist to accept that rubbing alcohol kills germs when you can see the results instantaneously under a microscope. Ecology studies can take years to generate results and most of the results are not easy to see unless looked at over time. I think this makes the public more skeptical about long-term economic studies.

I feel this is due to how we are taught about science in the early years of school and because of societies need for instant results. I think this is why modeling is so important in the study of ecology. It can allow non-scientists to digest the results of a long term or large-scale study in more of a manageable size. The best way to get the public to accept ecologists’ results, is to provide the visual illusion of an immediate and tangible result.

3. Dual Model Paradigm

The dual model paradigm involves building models that use deterministic functions and probability distributions. Deterministic functions give you the expected outcome of an experiment with specific inputs with no random deviations. Probability distributions show you all of the possible outcomes and the probability that they will occur. For example, if I wanted to find the relationship between the plot percentage cover of impervious surfaces and bear population, with a few points I could create a deterministic function that would allow me to put in any percent cover and be able to predict the population size. A probability distribution is applied differently. For example, I could collect data for if a bear utilizes urban resources or not (binomial data). I could then use a probability distribution to be able to predict, if I select a random bear, what is the likelihood it has utilized urban resources.

4. Populations

A statistical population is all of the individuals that could be sampled for a study. A biological population is all of the individuals in a desired species, even if they are located outside of the geographic area of the study. This means the statistical population may vary depending on the study design. While the biological population may be the same of the statical population if the study is designed to sample the entirety of the species, it is usually not the case.

5. Model thinking

The scenario my group discussed in class was about invasive cattails. Important data to have to study the composition of native and invasive cattails would be abundance data, characterized by each species in a given study area. This is count data, which is an example of categorical, nominal variable scale. Another way to study the cattails is to collect presence absence data at a given study area. This means to have data that says either “yes, cattails are present” or “no, cattails are not at this location.” This can be converted to a binary scale which is an example of using a discrete variable.