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Submitted: September 18, 2022
I didn't work with any other students

ECO 602 – Week 2 Reading Questions – Data and Model Thinking

Q1: Dichotomies (2 pts.): In 1 - 2 short paragraphs, explain the dichotomy in your own words and briefly describe how you might approach one of your research interests from each of the dichotomy endpoints.

One of the dichotomies in modeling is descriptive models vs. predictive models. A descriptive model is a broader model of an entire ecological system, with a goal of providing information about all the key factors or organisms which might interact with each other within the system. For example, I might use a descriptive model to show the many different factors that impact tick populations in a geographical region of interest. This could include temperature, rainfall, vegetation, and the populations of key hosts such as white-footed mice and deer. The goal of a predictive model is to use some of the inputs to provide insights into future patterns or trends in the ecological system. For example, I might use a predictive model to provide quantitative estimates of tick populations in a future year or season based on previous trends and the expected values of other factors for a given area.

Q2: Assumptions and Biases (2 pts.): Identify at least one source of bias or assumption (cultural, scientific, other). Hypothesize a practical impact these biases or assumptions might have on scientific communication and the effectiveness of management efforts? (1 - 3 paragraphs)

The quotes from McGarigal Ch 1 are assuming that the reader is a member of the western science community and that they come from a society that also values the concept of "innocent until proven guilty". The way these quotes are written could make people from other cultures feel excluded. This might be reinforced by the pictures on slides 4 and 5 of older white men as the "committee of scientists" you are theoretically testifying before as part of the example.

Q3: Dual Model Paradigm (2 pts.): In 1 - 2 short paragraphs, describe the following:

- Identify and briefly define the two primary components of a model constructed in the dual model paradigm.
- Give an example of the two components in the context of a system you are interested in studying.

A model constructed in the dual model paradigm includes deterministic and stochastic components. The deterministic component ignores any potential random variability in the system or variability due to measurement error. It shows the average association between the factors you are modelling. The stochastic component adds information about the variability around the average trend, since there needs to be a way to account for randomness due to measurement errors and random variability in the environment or interactions between organisms.

In the context of my research on ticks and tick-borne diseases, the deterministic component of the model might be the expected pattern of when people tend to experience tick bites throughout the year. The stochastic component would include variability due to errors in reporting tick bites and unpredictable variability in how and when people actually encounter ticks that year.

Q4: Populations (2 pts.): In 1 - 2 short paragraphs, describe the difference between a statistical and biological or ecological population.

- Which of these populations may vary depending on the spatial or temporal scale of the research question?

The ecological population is the entire range of the organism being studied. For example, the ecological population of the blacklegged tick (Ixodes scapularis) can be found across most of the eastern half of the United States and has been expanding north into Canada. The statistical population is the population that is being studied as part of the research question and we use a sample to estimate the parameters of that population. The statistical population includes all the sampling units defined by the research question. The ecological population does not vary depending on the scale of the research question, but the statistical population varies depending on the scope of the research question and the area or time period of interest.

Q5: Model Thinking (2 pts.): For each of your two chosen variables: Describe your proposed entity or variable and explain your chosen data type/scale is appropriate.

My group chose to use the example of the snow pack melt in the cascades. One of the variables I would measure would be the species of trees present as a categorical/nominal variable. This is appropriate because each species of tree has its own name and does not need to be represented as a range of values. The second variable would be the temperature variation because that should have a significant impact on the snowmelt each year. Temperature (in Fahrenheit) is a numerical value on an interval scale because the value of zero is not meaningful and there can be negative numbers.