Stella Dee

Week 2 Questions

I did not work with any other students.

Q1. The modeling dichotomy in scope and approach described by Bolker wrestles with the tension between idealized systems and embodied systems. The former is perhaps more useful to gain a general insight into the biological question at hand and the latter is more useful in a particular case to inform human management. In my research, the theoretical mechanical behavior of trees when subject to arboricultural pruning regimes can be modeled using mathematical approaches to structural dynamics designed for and by engineers. However, trees are a living organism, not a human-produced material, and so these equations do not always account for the behavior of specific trees, that may be missing roots on one side, or whose leaves may curl up to minimize wind impact, or that may contain rot. Therefore, an applied approach would be messier, perhaps less likely to generate insight at a population scale, but more helpful to understand the effects of pruning a particular tree in a particular way.

Q2. One assumption that tends to influence scientific communication is what I would call the academic assumption that everyone believes the veracity of historical documentation and fact. In the climate change example, past nesting elevations are a matter of past documentation. However, when I was working for a tree care company in eastern Massachusetts, my boss claimed that Christopher Columbus had landed on Plymouth Rock in Cape Cod. No evidence that I was able to present to him could convince him otherwise, despite the fact that the landing by Columbus is a matter of documented historical record. Academics tend to take for granted the fact that multiply.verified and replicated primary data and documentation is enough to convince the general public (McGarigal included), but this is simply not the case. I don't have the answer here; I'm not sure how to communicate science when some people simply choose their "belief" over historical or scientific fact, but it is a real-world challenge when communicating scientific information.

Q3. The primary components of a dual model paradigm include the deterministic and stochastic models. The deterministic component allows us to make predictions about average behavior, and the stochastic component allows us to describe variations from the average. In the context of tree reaction to arboricultural pruning, the deterministic component would allow me to describe average change in damping ratio following a certain pruning treatment whereas the stochastic model would allow me to better describe change in damping ratio for a hollow tree or one with severe rot that greatly differs from average.

Q4. The statistical population is the subset of the ecological population that you're actually able to study. Ecological populations don't change, but statistical populations may change depending on on what the study is trying to examine. This often will include changing depending on the spatial or temporal scale, because the limited amount of time available for all studies will limit the ability to study many if not most ecological populations. Similarly, usually studies of a statistical population will take place over a more limited geography than the geography over which the ecological population actually exists.

Q5. Consider the scenario your group chose to use in the model thinking in-class activity:

- Cattails

Choose 2 of the of the following data types and scales.

1. A categorical, nominal variable

   This would be appropriate for classifying which species of cattail is present. It might get a little complicated with unnamed hybrids, but assuming the study is not using complicated genetic analysis to measure the hybrids probably each cattail can be grouped into only one species, or at least a combined category of “mostly native” or “mostly invasive”.

2. A discrete variable

   This could be used to measure the presence or absence of a particular species of cattail in a particular plot. This could be useful for getting a rough sense of cattail distribution over space.