Analysis of Environmental Data
Reading questions: Week 2

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Q1: 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.

A dichotomous variable can be divided into two subsets, which are jointly and mutually exhaustive. This means that it can only belong to one part and not to both. Example from Bolker: Models on a population can either look at whole population densities which are continuous as the population insist, or at discrete individuals of the continuous population. A discrete measurement is therefore a particular moment I am picking out to make assumptions on the continuous event.

Continuous <> discrete:
A continuous variable describes an ongoing event/parameter, which is measured by (intermediate) numbers/values. An discrete variable is a particular unit/moment I am sampling and has therefore an end point. Discrete variables are measured in counts or absence/presence data.

My research on recreational fishing effects on striped bass' post-release mortality includes discrete and continuous variables. Discrete variables are measured by post-release death or survival. Additionally, reflex impairments are recorded once the fish is landed. Reflex impairment is a continuous variable since it is measured on a scale from 1-10.

Q2: 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?

Humans with different personal assumptions, experiences, perspectives and cultural background create concepts and run tests. This is why they are always biased and never 100% objective.

A practical impact biases might have on scientific communication and effective management efforts is that they create „heterogeneity of sciences". This induces multiple systems of knowing and engaging with methodologies developed within different cultural communities. Consequently, issues can be tackled from different perspectives and the right management strategies can be applied.

Q3: 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.**

The two components are the deterministic and stochastic model. A deterministic model calculates the average behaviour line of best fit (randomness excluded). The stochastic model brings in the randomness of a measurement and includes the noise variability away from the line of best fit (deviation). A random component can't be predicted. It won't align with the average of the deterministic model.

Research example: Out of 100 sampled fish, 70% survive after being released. For 10% of the sampled fish, data is not recorded properly since the tags were not adjusted correctly. Randomness here is created through a mistake in measurement, but can also occur due to unpredictable environmental events.

Q4: 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?**

A ecological population is the entire range of a species. A statistical population is a subset of the ecological population which consists of samples which consist of sample units.

The statistical population varies depending on the spatial or temporal scale whilst the ecological population will always consist of the entire species range.

Q5: Snowpack in the Oregon Cascades

The precipitation changes over years can be measured as a continuous variable on a ratio scale, because it will continuously rain every year and since it can't be negative it can be measured on a ratio scale.

The area of tree cover can be measured as a discrete variable on a binary present or absent scale.