Thursday Lecture

2024-10-10

**Hierarchical Habitat Selection**

Quiz:

Pseudo-optimization is a commonly used

? *Trying multiple different scales, varying grain and/or extent, using an imperical approach to pick the best scale that fits the species of interest rather than potentially biased*

?

* *Optimizing one covariate at a time.*
* *We are picking the range and increments of the scales, they are being constrained by choices we make.*
* *Multiple things influence our system at once, comparing scales separately can be wrongly interpreted because they could be influenced strongly by another covariate. Doing true optimization is difficult though due to computational constraints. Techni*

**Multi-Level Models**

Hierarchy in ecology: macro to micro levels, each level has components that make it up.

* Ecosphere > biome > landscape > ecosystem > community > population > organism > organ system > etc.

How animals might select habitat hierarchically. How might their selection process go about this?

* Human house example: Neighborhoods (crime rates, vibe) > distance from work > pricing, how the houses look > room within the house
* Dispersing animal: Search for part of landscape that has the cues they recognize as good habitat > now establish home range, roosting/foraging sites, areas of varying risk within the landscape (contstrained by where the animal chose to reside in the landscape).

Habitat selection hierarchy (DeCesare et al. 2012)

* First-order selection: available – geographic area where the animal is; used – population home ranges
* Second-order selection: available – population home range; used – individual home ranges
* Third-order selection: available – individual home range; used – locations within the individual home range the individual uses
* Fourth-order selection: available – resources available at the locations the individual is traversing; used – actual procurement of resources at that location

Advantages of looking at habitat selection in this hierarchical manner (multi-level analysis)

* Link between statistical results and the behavioral process of habitat selection.
* Different behavioral processes of the animal at each order. Relates to what the animal is actually doing in the field.
* Results in one level can inform results in another level.
  + Knowing level above informs you of constraints
  + Knowing level below informs you of mechanisms
  + Mt. Graham Red using forest, this selection has already occurred at the 2nd order, so looking at 3rd order we can delve further into the differences within the forest (pinecone production, canopy, tree height) rather than just saying they select forest.

Multi-level study is inherently a multi-scale study, but multi-scale study is not inherently a multi-level study.

* In multi-level study, 3rd order selection will be at smaller scale than 2nd order and so on
* In multi-scale study, you are comparing a range of scales, but only within a single order of selection