Tuesday Lecture

2024-10-08

**Scale in Wildlife-Habitat Analyses**

Quiz:

You are interested in the habitat associations of Pinyon jays in Arizona. You og to eBird, download all of the observations of Pinyon jays and create a Pinyon jay habitat model. Which of the two major types of wildlife-habitat data do you have and why?

* *You have* *used vs available (presence-only) data because you do not have information about sites where Pinyon jays are absent or sites that they did not use.*
* *You can measure habitat features that are available to Pinyon jays in Arizona.*
* *Why is this not presence/absence? eBird data, like most citizen science is opportunistic. You haven’t chosen a bunch of sites at random where you do point counts and determine whether or not Pinyon jays are present or absent.*

You conduct a radio telemetry study of Abert’s squirrels in the Catalina Mountains to determine how these squirrels respond to different degrees of forest burn severity. You measure habitat features at each squirrel’s telemetry observation. You then create home range estimates ? *Capturing habitat use and availability at the individual level.*

**Two components of scale: Extent and grain**

Both can be measured over space and time

* Grain: resolution of the data collected at observation level.
  + Size of your net
  + Example: collecting GPS points at 15 min or 4 hr intervals
* Extent: Size of study area or population, or longevity of study.
  + Size of the holes in your net
  + Example: How many animals you have GPS collared, how long they are collared for.

Insert figure from camera

Why care about scale?

* Variable we’re interested in can change over space/time.
* Considering scale as species-specific
  + different organisms experience the same environment at different scales (elephant vs ant)
  + avoid anthropocentric view
* Even inter-specific differences in behavior make difference in scale important
  + Male mountain lions will have larger ranges and move around more than females as they are the ones searching for mates.
* Variables within a habitat exist at different scales
  + Information being taken in about foraging may be closer in proximity (this bush to that bush)
  + Information being taken in about predation risk may be further in proximity (extent of field-of-view)
* Useful for making predictions for areas outside of where we observed or in the future.
  + Knowing and clearly defining your scales can make your predictions more accurate and prevent you from making inaccurate predictions not possible from your study.

How do we pick the scale at which we measure our characteristics of wildlife habitat?

* What is known about a species life history/ecology
  + Home-range, life-stage behaviors (juvenile dispersal)
* Try a bunch of different scales (multi-scale)
  + Not making any assumptions/guesses about what we think is important
  + Measure across a bunch of different scales and let the data tell us what is optimal for a species/age-group

**McGarigal et al. 2016**

Multi-scale analysis: Within a study collecting observations at varying grains and/or extents at which habitat features are measured then determining which scale best explains the variability in the data.

How might we pick our scales from this range of scales that were measured in a multi-scale study design?

* Pseudo-optimized scales: letting the data tell you what’s best
  + Pseudo-optimized single scale: Evaluate all covariates simultaneously across a range of scales and use statistical measures to select the single best scale for the model.
    - Choosing one landscape feature at one scale to explain the variation within data
  + Flawed because it is most often multiple variables that influence variation within data.
  + Because of this and computational requirements (lots of data), this is approach is not used very often
* (Pseduo-)optimized multiple scales: evaluate each covariate separately across the range of scales measured and use statistical measures to select the single-best scale for each covariate, and then combine the covariates (at their best individual scale) into a single multi-variable, multi-scale model.
  + Most common version of this approach