Thursday Lecture

2024-10-17

**Used-Available (Presence-Only) Data: Resource Selection Functions, Part II**

Quiz:

What is habitat selection from a quantitative or statistical perspective? *Disproportionate use of habitat features based on their availability.*

You externally attach some GPS transmitters to northern Mexican garter snakes along the Santa Cruz River in the San Rafael Valley of southeast Arizona. You estimate home ranges for each snale and conduct a 3rd order habitat selection analysis to determine if snakes are selecting riparian vegetation to their availability. If we think about habitat selection in a hierarchical manner, why might we have seen garter snakes using riparian communities in proportion to their availability? *Selection for riparian communities may have already occurred at a higher order of selection (e.g., 2nd order selection). Processes at higher hierarchical levels constrains patters at lower levels*

Resource selection functions largely synonymous with habitat selection functions.

**How we should (or not) be thinking about used-available data**

From lab, we generated random points in Lupe’s home range denoting them as available (0) and GPD locations as used (1).

* If you truly have used and unused data, your proportion of use is simply used/available (*p* = 20/70 = 0.29).
* What about when we increase the available random points?
  + You were anxiously submitting the CASC proposal and didn’t take any notes here.
* One of the key reasons why used-available data should not be modeled as binomial data
  + The intercept of a linear regression model is the proportion of 1s to the total number of 0s in your data. So, as you increase the number of available points, used data stays the same, therefore the ratio changes and the intercept decreases.

**Modeling Used-Available Data**

**Inhomogeneous Poisson Point Process Model (IPP)**

* Rather than thinking about the pixels on our maps and the values within those when looking at our use points, change our perspective to the true continuous space that the species is moving through.

Models (log)density of points in space as a function of spatial covariates

* *Log[λ(s)] = β1\*X1(s) + … β1\*X1(s) + β0*
  + (Log)density of points at some location
  + The slopes (relationships between [log]point density and covariates at location s)
  + Average density when all the covariates are zero (i.e., intercept)
* Related to *y = β1\*X + a*

Implications of the equivalence between the binomial GLM and IPP Model for Habitat Selection Functions

* Assume the exponential form of the selection function.
  + Exponential relationship with the slopes and covariates
* The binomial GLM is a computational trick to approximate the Poisson point process
* This selection function estimates ***relative*** selection strength or ***relative*** intensity of use (relative intensity of the IPP)
  + Relative values rather than absolute values
* Conceptual basis for using a large number of random points