

## Lab 10.

### Nestedness in Community Structure.

Communities that are subsets of a larger community (e.g. island communities founded from a larger mainland pool of species) may consist of random subsets of species (i.e. all species combinations are theoretically possible) or they may be nested subsets (i.e. highly ordered, so that for any subset of a given size the species combinations are predictable). High degrees of nestedness imply a community structured by rigid assembly rules or very predictable extirpations.

Given a data matrix of presence/absence values for an archipelago of islands of differing species richness, it is possible to calculate the degree of nestedness of the system. Atmar and Patterson have developed a Windows-based program that determines this value, which they refer to as the “nestedness temperature”. In this index,  $T = 0$  corresponds to perfect nestedness, and  $T = 100$  corresponds to complete randomness. By Monte Carlo simulation, the Atmar and Patterson model can also determine the probability of seeing the observed level of nestedness by chance alone.

#### The Exercise.

Download the Nestedness Calculator ([http://www.fmnh.org/research\\_collections/zoology/nested.htm](http://www.fmnh.org/research_collections/zoology/nested.htm)) to a Windows-based computer and open the self-extracting file to a convenient directory.

Run the Calculator. Use “load data” to select the “Amazfrogs” data set. This consists of presence-absence data for 40 species of frogs occurring in habitat “islands” (fragments) in the Amazon rainforest. Run the analysis (read the notes, pack the matrix, calculate the nestedness ‘temperature’ and calculate the probability of obtaining the observed degree of nestedness by chance alone.) Be sure to read the associated theory.

**Is the Amazon frog community highly nested or not? Is the degree of nestedness statistically significant?** (note: by convention, statistical significance is achieved at  $p < 0.05$ )

**What does this result mean for Amazonian frogs in the context of the debate over whether conservation resources are better concentrated in a small number of large reserves or many smaller reserves?**

The program includes 293 other datasets. **Select one other matrix of your choice, analyse it, and summarize the results** (be sure to include a description of the dataset!).