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## Talks

### Seminar Abstract

**Friday, June 08, 2007 • 12:15 PM • Medium Conference Room, SFI**

**Sebastian R. Abades** Center for Advanced Studies in Ecology and Biodiversity (CASEB),  
Department of Ecology, Catholic University of Chile

#### *Using Statistical Mechanics to Organize Large Scale Ecological Patterns*

We attempt to construct statistical descriptions of the spatial patterns of abundance in geographical populations. As a first approximation, we analyzed the statistical distribution of intra-specific local abundances for a set of North American breeding bird species. We made local abundances frequency plots for every species, and found that they showed long-tail behavior truncated at a maximum abundance cut-off value. Using finite size scaling arguments, we investigated whether frequency curves may be considered as scaled copies of each other. Data collapse was possible using the total abundance of each species as a proxy for system size, recovering the underlying universal finite size scaling function. A second approximation focus on describing the internal structure of species' geographical ranges using predictions from the spatial theory of critical phenomena. We selected a set of North American breeding bird species (permanent residents only), and used their temporal

abundance trends to build occupancy maps. Several static measurements were done on these maps to generate a macroscopic description of landscape occupancy and connectivity. We found that the spanning cluster size, mean cluster size and correlation length, behaved as expected from percolation theory. Critical landscape occupancy was characterized by critical exponents interrelated through hyperscaling.



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