Adriana Bernal Escobar
Universidad de los Andes
e-mail: ad-berna@uniandes.edu.co
Juan Cordovez
Universidad de los Andes
Esteban Payan
Panthera Foundation

Spatial explicit dispersal modeling for the conservation of jaguars in Colombia

Mathematical models that go beyond traditional conservation paradigms that allow for the identification of corridors and potential areas for species dispersion have proven to be an important and useful tool in the proposal of new conservation and management plans (Adriaensen et al., 2003; Beier et al., 2009; Ray et al., 2002; Rabinowitz & Zeller, 2009). Particularly in the conservation of jaguars, Rabinowitz & Zeller (2009) gave a first push by analyzing the species at a metapopulation level and measuring connectivity as they produced a complex path of interconnected populations. This model was based on a least-cost methodology that in spite of its virtuosity gave only a steady state analysis of the connectivity and distribution of the jaguars that does not necessarily reflects the current situation. Their results identified Colombia as a key element for connectivity between north and south populations, but for some parts of the country it did not accurately capture the most suitable areas for dispersion. We previously proposed an spatially explicit dispersal model based on the least-cost matrix obtained from the least-cost analysis, to provide temporal information about the sustainability of the areas for jaguar dispersion, and increase accuracy by scaling the area of study to Colombia. The model proved to be a better tool for dynamical studies, however some of the simulations showed a deviation from total population prediction respect to field data. We speculated that this discrepancy is mainly due to our way to compute diffusion coefficients, carrying capacities and boundary conditions. Here we present a modification of the model that includes a new methodology for estimating those parameters that includes the notion of jaguar conservation units (JCU), as defined by the current conservation program. Here we present preliminary results from this modified model and compare it with previous simulations. We found that accurately defining the carrying capacity and including boundary conditions that mimic better the ecology of the specie gives an overall improvement in terms of our ability to predict current population densities and temporal aspects of the population dynamics.