Multiscale drivers of space use and occurrence of an endangered bird species in a metapopulation context: from connectivity to habitat quality

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Abstract

Habitat selection is a multifactorial process, dependent on factors measured at different scales. In this work, we evaluate the relative importance of factors measured at three scales: metapopulation, landscape and microhabitat-scale, on the occurrence and space use by Dupont’s lark (*Chersophilus duponti*) on an extremely fragmented metapopulation. Space use was estimated by Kernel density function estimators on 2015 locations of bird territories. We performed two Partial Least Squares Regressions (PLSR), which accounted for 74.18% and 78.47% of the variance in the species’ occurrence and space use respectively. Landscape-scale factors had the greatest explanatory power in both PLSR (56% and 52% respectively), followed by metapopulation-scale factors (29% and 26%) and microhabitat-scale factors (24% and 22%). Connectivity was a key factor in explaining space use and the occurrence of the species, according to the conceptual framework of metapopulation theory. However, other factors were explicative too. At landscape-scale, distance to wind farms was crucial for the occurrence of the species; while the availability of potential habitat significantly affected the space use by Dupont’s lark. At the microhabitat-scale, the presence of suboptimal habitat determined the occurrence; while the space use depended on the biomass of *Coleoptera* and *Formicidae*, and on moss cover.

These results highlight the hierarchical character of the habitat selection process and the need to address these studies from a multidimensional approach. The connectivity, the availability of potential habitat or the presence of human disturbance are already known factors in determining space use and occurrence of species. Nonetheless, habitat quality at microscale must be highlighted by their impact on space use patterns. Therefore, conservation measures should be undertaken at different scales: ensuring the connectivity between patches and improving the habitat quality within-patches.

Keywords: Habitat selection, metapopulations, potential habitat, spatial dimension.