Uncertainties in the identification of potential dispersal corridors: The importance of behaviour, sex, and algorithm

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Abstract

Modelling landscape connectivity represents one of the central challenges for conservation of natural resources, especially in human dominated landscapes. Many different methods have been developed to this effect, but their assumptions and limitations have been largely ignored. Using high resolution GPS tracking data from brown bears (*Ursus arctos*) in central Italy, we investigated the influence of behavioural state (movement vs other behaviours), sex, and algorithms, namely least cost path and circuit theory, on the identification of structural corridors. In particular, considering that most studies does not account for behavioural states and/or individual characteristics, and that basically all studies consider only a single corridor algorithm, we performed (1) a within-algorithm comparison, under the hypothesis that both behavioural states and sex would influence prediction of structural corridors, and (2) a between-algorithm comparison, under the hypothesis that different algorithms would predict different corridors. We found that the impact of sex and/or behavioural state was substantial. On average, least cost path corridors for moving females were 4.7 km apart (st.dev = 7.6 km) from corridors for moving males, and 5.0 km apart (st.dev = 7.2 km) from corridors not considering sex and behaviour. The same was true for circuit theory corridors. The between-algorithm comparison showed that the two corridor models yielded almost identical results, with >80% of the least cost path corridors falling into the two top deciles for the corresponding circuit theory corridors.

Our results suggest that the failure to consider an animal's behavioural state and/or intraspecific differences may result in misidentification of corridors, with potential misallocation of the limited conservation resources available.

Introduction

The loss, fragmentation and degradation of natural habitats are among the main threats for biodiversity (Boitani, Falcucci, Maiorano, & Rondinini 2007), both at the global and at the local scale (Fahrig 2003). The problem is particularly important in human dominated landscapes (Saura, Bodin, & Fortin 2014), where the long-term persistence of species is dependent upon their capacity to traverse intensively human-modified landscapes to reach new habitat patches (Schloss, Nuñez, & Lawler 2012).

Corridors can be defined as regions/areas that facilitate the movement of individuals and/or genes, or promote the persis-

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