Supplementary Information to “Evaluating Connectivity Models for Conservation: Insights from African Lion Dispersal Patterns.” submitted to Landscape Ecology, by: Genevieve E. Finerty, Samuel A. Cushman, Dominik T. Bauer, Nicolas B. Elliot, M. Kristina Kesch, David W. Macdonald, and Andrew Loveridge.

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Methods & Materials for Resistance Surfaces

The resistance surfaces used in this study were generated by Elliot et al. (2014) using Global Positioning System (GPS) data from 50 African lions (11 male natal dispersers, 20 adult males, and 19 adult females) over 10 years. Elliot et al. (2014) used a path level analysis to parameterise demographic-specific resistance surfaces for the Kavango Zambezi Transfrontier Conservation Area (KAZA) in Southern Africa.

Resistance Inputs

Landscape Features: Elliot et al. (2014) used three groups of environmental variables to represent the landscape: land use, habitat, and anthropogenic. Land use variables were based on GIS layers from the World Database on Protected Areas (IUCN & UNEP 2010) and included: National Parks, Forest Reserves, Wildlife Management Areas, and Agro-pastoral lands. Habitat variables were created the European Space Agency (ESA) global land cover map, version 2.3 (ESA & UCLouvain 2010). The habitat classifications present within the study extent were grouped into three broader categories: woodland, shrubland, and bushed grassland. Anthropogenic variables included: human density from Gridded Population of the world (CIESIN & CIAT 2005), towns digitised by authors using DigiPoint3 (Zonum Solutions 2010) in Google Earth (Google Inc. 2011), and highways recorded using a handheld GPS device. Any layers that were coarse-grained in their original form (>500 m) were resampled to 500 m using nearest neighbour (for categorical variables) or bilinear interpolation (for continuous variables) in ArcInfo Workstation

(ESRI 2010). Layers that had a resolution <500 m were retained in their original form.

Lion Movement Data: Lions were fit with GPS radio-collars programmed to take hourly fixes from 18h00 to 07h00. All lions were collared within the Hwange National Park and surrounding areas and included 11 male natal dispersers, 20 adult males, and 19 adult females (total 50). Demographic categories were determined using field observations. All individuals classified as “Adults” were at least 4 years old and normally observed in established territories. “Dispersing males” described individuals in the period between leaving the natal pride as subadults and establishing a consistent home-range (>2 months).

Path level analysis: Elliot et al. (2014) used a path selection function to predict lion movement as a function of their landscape features. The data for each individual lion was split into sequential temporal windows of 30-day intervals and sequential locations within each window were converted into a path. Predictor variables based on the mean value for each GIS variable of all pixels along the utilised and available path trajectories were fed into a conditional logistic regression analysis at four spatial scales.

Resistance Surfaces

Beta coefficients from the conditional logistic regression analyses were used to create resistance surfaces (Fig XX) for each demographic category (adult males, adult females, dispersing males). Resistance surfaces were created in ArcInfo Workstation (ESRI **2010**) by calculating $z = \beta_1 v_1 + \beta_2 v_2 + \ldots + \beta_n v_n$, where β_i is the coefficient from the path selection function for variable v_i and rescaling such that resistance = $(z * -1)/\min(z * -1)$. Each surface had a resolution of 500 m. The range of resistance values obtained varied between the three demographic categories, and mean resistance for adult males was twice as high (mean ± SD = 61·096 ± 191·2) as that of dispersing males (mean ± SD = 29·8 ± 101·9), while adult females had the highest resistance (mean ± SD = 82·7 ± 448).

References

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