188

Simulating animal movement from models derived from integrated step-selection analyses

Habitat selection of animals is of central importance for understanding animal behavior, population viability and species distributions. Step-selection analyses (SSA) offer a popular statistical framework for quantifying habitat selection from telemetry data. Recently, it has been shown how one can include functions of step length and turn angles in the linear predictor of the selection function to account for the movement process, leading to what has been referred to as an integrated step-selection analysis (iSSA). By including these predictors, it becomes possible to estimate a selection-free movement kernel in addition to a habitat selection function. This explicit consideration of movement and habitat selection makes it possible to interpret iSSAs as individual-based models of animal movement.

Here, we demonstrate how the formulation of the iSSA can be used to derive an individual-based model of animal movement in discrete time and continuous space. At each time step the next position of the animal is determined by sampling from a selection-free movement kernel and a habitat kernel. We then demonstrate straightforward methods for simulating animal movement from models derived from iSSAs. Finally, we illustrate how this approach can be used to generate movement data for simulation studies and how future movements of animals, possibly under altered environmental conditions, can be predicted.