126

A dynamic occupancy model for interacting species with two spatial scales

Occupancy models have been extended to account for either multiple spatial scales or species interactions in a dynamic setting. However, including nested spatial scales might be especially relevant to models of interacting species (e.g predator-prey) as they often operate at different spatial scales. Here we bridge these two model frameworks by developing a dynamic multi-scale two-species occupancy model. The model estimates species specific initial occupancy, colonization and extinction probabilities on two nested spatial scales conditional to the other species' presence. We conduct a simulation study that demonstrates the model's ability to estimate parameters without marked bias under low, medium and high average occupancy probabilities, as well as low, medium and high detection probabilities. We further evaluate the model's ability to deal with sparse field data by applying it to a multi-scale camera trapping dataset on a mustelid-rodent predator-prey system. We find that this model framework creates opportunities to explicitly account for the spatial structure found in many spatially nested study designs, and to study interacting species that have contrasted movement ranges with camera traps.