EFFECTS OF HABITAT FRAGMENTATION AND LANDSCAPE CONTEXT ON MEDIUM-SIZED MAMMALIAN PREDATORS IN NORTHEASTERN NATIONAL PARKS

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Abstract

Human disturbance is a significant source of land use change around the world, specifically in the northeastern United States, where expanding human populations are causing increased landscape development, habitat fragmentation, and pressure on wildlife populations. The effects of fragmentation on a number of wildlife species have been well-documented, but for species like medium-sized mammalian predators that are often cryptic and elusive, these effects are difficult to evaluate and not well understood. Medium-sized mammalian predators occupy an important niche in most ecosystems and because they are wide ranging may be more sensitive than other taxa to landscape scale influences. In 2004, I used remote cameras, track plates, and hair traps to collect presence/absence data on medium-sized mammalian predators in 8 National Park Service (NPS) sites in the northeastern United States. I collected data on environmental variables at multiple spatial scales and modeled the responses of 10 mammal species to these variables using site occupancy models that incorporate the probability of detection for each species. Detection probabilities for medium-sized mammalian predators varied among time, space, and species, were all <1 and most frequently <0.4. Cumulative detection probabilities showed that the number of days of sampling will range between 18 and 174 to detect the target species with a 95% level of confidence. Using site occupancy models to account for this variation in detection, I determined that landscape scale variables were good at describing differences in the occurrence of predators. Variables that focused on the amount of human disturbance, such as the amount of landscape development, fragmentation, and distance to the nearest occupied building, were the most important in describing the probability of site occupancy. At the local

scale, habitat variables such as canopy closure, coarse woody debris, and habitat edge were more important to the target species than the proportion of non-native vegetation or vegetation diversity. Overall, models that included variables from multiple spatial scales increased the accuracy of site occupancy estimates, but no single spatial scale was consistently better than others. My research suggests that landscapes surrounding NPS sites should be considered as important sources of variation in species presence and patterns of distribution. Detection is an important parameter to incorporate when sampling wildlife populations because detectability varies over time and space, and non-detection of a species does not imply absence. My study provides statistically valid occupancy estimates for 10 medium-sized mammalian predators that will allow the NPS to track meaningful population changes as part of long-term monitoring efforts.