

ABSTRACT

Wildlife populations are spatially controlled and undergo frequent fluctuations in abundance and site occupation. A comprehensive understanding of dynamic species processes is essential for making appropriate wildlife management plans. Here, we used a multi-season model to describe the dynamics of occupancy estimates of the carnivores: North Chinese leopard (*Panthera pardus japonensis*, Gray, 1862), leopard cat (*Prionailurus bengalensis*, Kerr, 1792), and red fox (*Vulpes vulpes*, Linnaeus, 1758) in the Tieqiaoshan Nature Reserve, Shanxi Province, China, over a three-year study period using camera traps data. The occupancy probability of the North Chinese leopard did not markedly change with time as the occupancy equilibrium was constant or slightly enhanced. The occupancy of the leopard cat decreased with time. The occupancy equilibrium of the red fox alternately increased and decreased. However, all species presented a slight level of occupancy stability due to their small values of the rate of change in occupancy. Environmental factor and anthropogenic disturbances slightly influenced the occupancy of all species and the colonization and extirpation probability of the red fox. The colonization and extirpation for all species were relatively more strongly affected by the distances to villages and roads. Moreover, elevation increased the colonization and decreased the extirpation for the leopard cat. Species interaction factors increased with time for all species. The North Chinese leopard and the leopard cat avoided each other. The leopard cat and the red fox independently co-occurred. There was true coexistence between the North Chinese leopard and the red fox. This research confirmed that environmental factors and human perturbations are vital factors to consider in wild carnivores' conservation and management.

Keywords:

anthropogenic disturbances; colonization; environmental factor; extirpation; occupancy; species dynamics