

Fine-scale temporal and spatial population fluctuations of medium sized carnivores in a Mediterranean agricultural matrix

Hila Shamoon, David Saltz, Tamar Dayan

Abstract

Context: Many Mediterranean ecosystems are human-dominated landscapes comprising a mosaic of agricultural, natural and semi-natural habitats alongside urban areas. The size, spatial pattern and connectivity of these “mosaic landscapes” promote changes in wildlife behavior, movement patterns and habitat use. Objectives Study how spatiotemporal landscape changes impact the spatial dynamics of a mammalian carnivore guild.

Methods: We quantified multi-season activity rates/density from camera trap encounters using N-mixture models. One hundred cameras were located at 25 sites, divided into five categories: nature reserve; large natural area; vineyards within natural area; vineyards near settlements; vineyards within the core agricultural matrix.

Results: Golden jackals (*Canis aureus*) were active in anthropogenic modified landscapes. Red foxes (*Vulpes vulpes*) avoided the core activity areas of jackal during summer and restricted their activity to their peripheries. European badgers (*Meles meles*) were active in natural patches during winter, but shifted their activity during summer to agricultural fields embedded within natural patches. Feral cats (*Felis catus*) were highly active in the natural patches during winter and shifted their activity to the agricultural matrix during summer.

Conclusion: Intra-guild spatio-temporal activity patterns of carnivores in mosaic landscapes are distinct and unique to each species. The patterns were affected by season, land-use, and jackal activity rates, reflecting inter-specific resource-dependent competitive interactions. The findings

highlight the complexity of intra-guild space-use patterns, and shed doubt on the effectiveness of simple solutions to landscape conservation problems.

Keywords: Agriculture _ Carnivores _ N-mixture models _ Species distribution models _ Habitat selection _ Interspecific competition