
Investigating population dynamics of red deer in different ecological contexts

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Résumé

In the context of climate change and expanding human impact, habitat fragmentation has become a pressing issue, driving terrestrial populations to varying degrees of isolation and adaptation to fragmentation. Some populations successfully maintain connectivity with others, while others face isolation, leading to potential challenges such as high population density, its associated negative impacts on demographic parameters like survival and reproduction, and likely inbreeding depression. Understanding the intricate interplay between population dynamics, environmental factors, and genetic processes is essential for effective wildlife management and conservation. We investigated three decades of population dynamics on two red deer populations in France, living in very different ecological contexts: one inhabiting an open, unfragmented environment in La Petite Pierre (Grand Est), and the other enclosed by a wall at the Chambord national estate. For each population, we built a Bayesian Integrated Population Model (IPM) to reconstruct past population dynamics and predict future short-term trajectories to advise on harvest management. Our models incorporated modeling of survival for three age classes and both sexes, as well as reproduction, harvest, and population counts while considering density-dependent effects. We assessed survival estimates with multi-state models accounting for reproductive status and dispersion.

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Despite their divergent ecological contexts, both populations exhibited key traits typical of wild ungulates, including high adult female survival rates (around 0.9) and robust pregnancy rates (> 0.8). The Chambord population appears healthier than one might expect from a closed population isolated for centuries, possibly due to efficient management strategies such as harvest plans and the large surface area of the territory, around 5 times larger than the average deer home range. Our ongoing analysis, including an assessment of genetic diversity, should deepen our understanding of these populations' dynamics, helping us elucidating how red deer adapt to environmental changes such as habitat fragmentation and harvest pressure.

Mots-Clés: red deer, population dynamics, functional connectivity, closed populations, Integrated Population Models, wildlife management