Ecology, physiology and behaviour

Survival, habitat selection, and success of wildlife reinforcement: a case study of European brown hares in a grassland-dominated landscape

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The anthropisation of environment and habitat fragmentation are major drivers of biodiversity loss, eroding the resilience and genetic diversity of local populations, making wildlife reinforcements increasingly necessary to ensure their conservation. However, the factors influencing the success of such operations, in particular the survival and habitat selection of released individuals, remain poorly documented for certain species and certain landscape types. Several studies have investigated the effects of European brown hare (*Lepus europaeus*) translocations. However, the survival and habitat selection behaviour of released hares, as well as the spatial and temporal impacts of reinforcements, remain poorly understood in grassland landscapes. Therefore, our study aims to characterise the impacts of hare reinforcements into grassland-dominated landscapes with low hare densities in terms of: (i) survival and causes of mortality of released individuals, (ii) their habitat selection, and (iii) the overall spatial and temporal impact of releases on local population dynamics.

A total of 103 hares from a professional breeding facility were released in two waves (51 in 2021 and 52 in 2022) in a mid-mountainous grassland-dominated landscape (2000 ha, Jura Mountains, France) with a low hare density. Movements and survival were monitored using GPS collars and the carcasses were examined in a veterinary lab to determine the cause of death. Local population density estimates were conducted before, during, and after releases using point transect sampling in and outside the reinforcement area (63 points in 10,000 ha large area).

Overall survival rates were low, primarily due to predation, roadkill, and diseases although the distribution of causes varied over time. At the landscape level, released hares favoured closed habitats (i.e., forest and hedges), while avoiding built areas and roads. Within their home range, hares selected closed habitats during the day (inactive period) and open habitats (i.e., grasslands and winter cereals) at night (active period). Bayesian spatiotemporal generalized linear mixed models indicated that reinforcements had little short-term overall impact on local hare population dynamics. The spatial impact of releases was restricted, while the observed densities increased post-reinforcement. These findings provide crucial insights to optimize population reinforcement efforts by identifying preferred habitats and key mortality factors for released hares. This information not only enables future releases to be targeted in more favourable environmental conditions—ultimately increasing survival rates and supporting long-term stability of reinforced populations—but also enhances our understanding of ecological dynamics and habitat requirements of wild hare populations.