



Opinion

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# Forest Management as a Component of Ungulate Management to Avoid Game Damage



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## Abstract

Wild ungulates are an important site factor in forests and landscapes. Impacts of ungulates on forest vegetation and the effect of hunting systems are often investigated and discussed. In contrast, the impact of silvicultural systems on forest damage by ungulates is much less noticed. Therefore, in a long-term research program in Central Europe since the 1990s two questions were investigated additionally, (i) in which way can forest management systems and landscape structures influence the interactions between ungulates and forest vegetation, and (ii) how can silvicultural practices modify the susceptibility of forests to damage by ungulates. The results showed a strong impact of these factors on the emergence of game damage to forests. Factors that are often underestimated in practice. Recommendations for a coordinated management of different land users to avoid ungulate damage to forest vegetation and to preserve biodiversity were made.

**Keywords:** Forestry; Silviculture; Ungulates; Game damage; Wildlife ecology; Integrated management

## Background, Basics

In Central Europe, particularly in Germany and Austria, forest and ungulate game are traditionally regulated in separate laws (forest laws, hunting laws). Other human activities, such as agriculture and outdoor recreation that also impact wildlife-forest interactions are regulated in further laws, often without consideration to ungulates and their impact on vegetation. Therefore, wildlife, plants, and landscapes were not really understood as a joint ecosystem and interactions in the system were neglected. Often a lack of knowledge and of coordination between forestry and hunting measures promotes game damage [1]. In the research program these basics and interdependencies in different regions and landscapes were investigated, and measures for an integrated forest-game management were recommended to prevent game damage efficiently [2–6]. Possible causes for increased game damage were described systematically [7–9]. Viewing the last decades, background, developments, perspectives of the game-damage problem and the forestry-hunting conflict have been analyzed and summarized [10, 11].

## Modeling

On the basis of the results from the investigations, models for assessing the habitat quality for roe deer and the susceptibility of

the forest to browsing damage were created [12–14]. Further, the susceptibility of forests to bark peeling by red deer was modeled [15].

## System components

In order to obtain an understanding of the forest-ungulate compartment in the ecosystem with the aim of better management, the impact of ungulates on forest vegetation, as well as the impact of habitat structure and dynamics on ungulates (density, distribution etc.) and on the forest's susceptibility to game damage should be considered. Browsing and peeling impact depends markedly on silvicultural techniques. The attractiveness of habitats for game depends not only on food supply, but also, to a high degree, on food-independent habitat factors such as terrain conditions, climate, edge effect, disturbance and competition impact, and thermal and hiding cover availability. Forests with a badly managed ratio of settling stimulus to available food act as 'ecological traps', where the food needed for the over-abundant game ungulates is taken increasingly by twig browsing and bark peeling of timber species. In general, one can say that a clear-cut system is attractive to deer and chamois. It is easy to hunt in, but it is susceptible to game damage. In particular, clear cutting in

narrow strips and reforestation have a high predisposition to game damage. In contrast, selective silviculture results in a more balanced system with less impact by ungulate game on forest vegetation, though hunting might be more difficult. Higher deer densities need not be associated with greater browsing damage; such damage also depends strongly on the growing-stock target and the silvicultural system. If forestry practices are 'close to nature', an occurrence of ungulates may also result in a greater density of forest regeneration and a better mixture of tree species.

### Conclusion

The important conclusion is that unacceptable game damage is promoted by poor forestry practices. To counter this, forestry must rehabilitate monocultural forests to be more natural, and natural regeneration strategies must be the preferred ones. Clear cutting with a need for artificial reforestation should be avoided, thereby further reducing the predisposition of a forest to game damage. It has been shown that such forest management is economically viable (e.g. (16)), indeed often more profitable than clear-cut management. However, provision of related information and training for foresters and hunters alike must be intensified. At the same time the forester achieves an optimal forest environment that satisfies the hunting fraternity, the public, and the demands of tourism also.

### Recommendations

(i) See the forest ecosystem, including its animals, holistically; (ii) recognize the importance of the silvicultural system as a habitat factor; (iii) include ungulate game as a site factor in forest management; (iv) recognize the importance of the silvicultural system as a game-damage factor; (v) define management targets clearly to be able to recognize 'damage'; (vi) in assessing damage, take compensatory mortality of trees into account; (vii) reduce food-independent settling stimuli; (viii) improve natural food availability; (ix) avoid clear cuts and optically striking stand edges; (x) promote natural regeneration in silviculture; (xi) coordinate habitat and ungulate management; (xii) support more interdisciplinary research into forest-ungulate-man interactions.

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