

Radio-telemetric monitoring of dispersing stag beetles: implications for conservation

M. Rink & U. Sinsch

Institute of Integrated Sciences, Department of Biology, University of Koblenz-Landau, Koblenz, Germany

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Correspondence

Ulrich Sinsch, Institute of Integrated Sciences, Department of Biology, University of Koblenz-Landau, Universitätsstr. 1, D-56070 Koblenz, Germany.

Email: sinsch@uni-koblenz.de

E-mail: hirschkaefer-rink@t-online.de

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Abstract

Migratory movements of the endangered stag beetles *Lucanus cervus* (18 males, 38 females) were monitored radio-telemetrically for three reproductive periods (2003–2005). The aim of the study was to estimate the migratory range of free-ranging individuals as a measure of connectivity among neighbouring populations for future conservation measures. Miniature transmitters of *c.* 350 mg (battery life: 10–15 days) were attached externally to the pronotum. Transmitter/beetle mass ratio was 12.8% on average (7.1–28.0%). Male dispersal behaviour consisted of frequent flights directed to sites with reproductive females and rarely of on-ground movement. Total displacement distance recorded was up to 2065 m, the maximum distance of a single flight being 1720 m. Flights always began at elevated structures such as trees and shrubs and took place in an air temperature range of 11–27 °C. Within this range, temperature did not influence flight distance. Female dispersal behaviour consisted mostly of a single flight, followed by mating and consequent ground movements towards oviposition sites. Total displacement distance recorded was up to 762.6 m, the maximum distance of a single flight being 701 m. Climatic constraints of flights were the same as in males. Modelling the dispersal behaviour suggests that about 1% of males are capable of maintaining gene flux among nest sites within a radius of about 3 km. However, the colonization of new nest sites depends on the dispersal ability of females and amounts to less than 1 km. Thus, isolated populations (distance to the next population greater than 3 km) have an increased probability of local extinction.