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Geographic distribution of the red deer *Cervus elaphus* in Luxembourg

by

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Résumé: La répartition géographique du cerf élaphe *Cervus elaphus* au Luxembourg est présentée d'après l'analyse des nombres de cerfs tués entre 1990 et 2004. L'espèce est distribuée de façon non uniforme, mais connaît des centres de répartition bien localisés, notamment dans le centre et dans le nord du pays.

Zusammenfassung: Die geographische Verbreitung des Rothirschs *Cervus elaphus* in Luxemburg wird anhand der getöteten Rothirsche von 1990 bis 2004 analysiert. Demnach ist die Art nicht uniform verbreitet, sondern hat ihre Hauptschwerpunkte vor allem im Zentrum und im Norden des Landes.

Abstract: The geographic distribution of the red deer *Cervus elaphus* in Luxembourg was analysed using numbers of killed red deer from 1990 to 2004. The species is not distributed in a uniform manner, but has distribution hotspots in the centre and in the north of the country.

Key words: red deer, *Cervus elaphus*, distribution, Luxembourg.

1. Introduction

The red deer *Cervus elaphus* (Linnaeus, 1758) is the largest native mammal species currently present on the territory of Luxembourg. Numbers of red deer shot increased steadily after World War II until about 1980, and remained relatively constant thereafter, subject to inter-annual fluctuations (Schley et al. 1998). On the one hand, the red deer is an important game species; on the other hand, it can sometimes damage agricultural crops, and more importantly, conifer plantations, giving rise to economic damage (Koubek & Zima 1999, Schley 2000, Bützler 2001). Thus far, the highest known single case of red deer damage to a conifer plantation in Luxembourg amounted to 54200 €. It is therefore important to know more about the species' population status and geographic distribution in this country.

2. Methodology

As the study site, the entire territory of Luxembourg was used (see Schley 2000).

Firstly, the trends over time in the total number of red deer killed per year from 1990 to 2004 were examined.

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Secondly, the numbers of red deer killed – either hunted animals or road kills – per 10 km^2 over this 15-year period were mapped.

The study was based entirely on the official hunting and road kill records kept by the *Administration des Eaux et Forêts*. Since the 1989/90 hunting season, hunting and road kill records have been very detailed. Because the data are collected with great precision and cover the whole country, they should give a good reflection of trends in the population size of this hunted species. Data are classified separately for each of the 600 hunting areas of Luxembourg (see Schley 2000); however, since these areas are too small to yield useful results, the data on distribution were analysed with the 'commune' - rather than the hunting area - as the geographic unit. Each of the 118 communes included on average 5 hunting areas. If an individual hunting area was divided by communal borders, it was assigned to the commune into which the majority of its area fell.

3. Results

Overall, and despite inter-annual fluctuations, the numbers of red deer killed have increased over the past 15 years (Fig. 1). This observed increase is statistically significant (linear model: $r^2=0.368$, $F_{1,13}=7.57$, $P<0.05$).

During this time span, 2006 red deer were killed. 1851 (92.3%) of these were killed through hunting, and only 155 (7.7%) were road kills, so that the results mainly reflect the hunting records of red deer.

Most red deer were killed per km^2 in the centre and the north of the country, and there seem to be three main distribution hotspots (Fig. 2). One is in the North-East along the Luxembourg-German border, encompassing the communes of Heinerscheid, Hoscheid, Hosingen, Munshausen and Putscheid. The second is located in the centre and made up of the communes of Fischbach, Heffingen, Larochette and Lintgen, and the third is also located more centrally and made up of the communes of Bissen, Colmar-Berg, Ettelbruck, Feulen, Grosbous, Heiderscheid, Mertzig, Schieren and Vichten. On the other hand, the southern part of Luxembourg seems to be almost completely free of red deer.

Over the 15-year span that was analysed, 1262 (63%) red deer were killed in the seven communes of Bissen, Colmar-Berg, Ettelbruck, Feulen, Fischbach, Larochette and Mertzig, which total 4.5% of the surface area of Luxembourg. The commune of

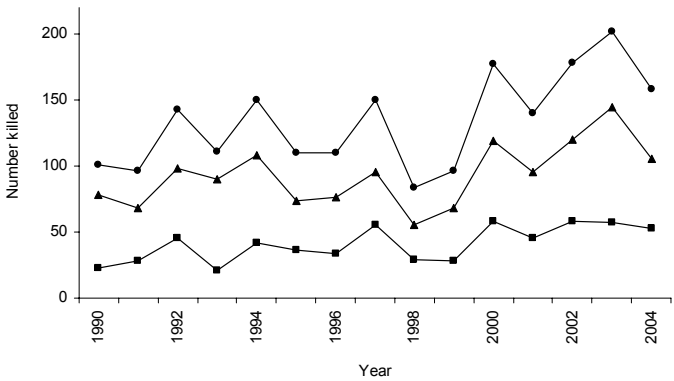


Fig. 1. Number of red deer killed over the period 1990-2004. Squares represent the stags, triangles the hinds and calves, and circles the total number.

Colmar-Berg alone (12.31 km^2, 0.48% of Luxembourg's surface area) accounted for 369 animals (18.4% of the total of 2006 animals).

4. Discussion

Data from hunting records are a useful tool with which to evaluate trends in game populations (Gérard et al. 1991). In this study, the results indicate that the red deer population in Luxembourg is increasing. Moreover, the results show that the red deer is not distributed in a uniform manner, but has clear distribution hotspots. Only seven communes, making up 4.5% of the territory of Luxembourg, accounted for 63% of the red deer kills. There seems to be a very high density of red deer in these areas. The reason for this phenomenon is not clear, and further and more in depth investigation is needed with regard to the analysis of habitat variables, levels of supplementary feeding, and other potential factors that may contribute to shaping such a differential distribution of red deer kills.

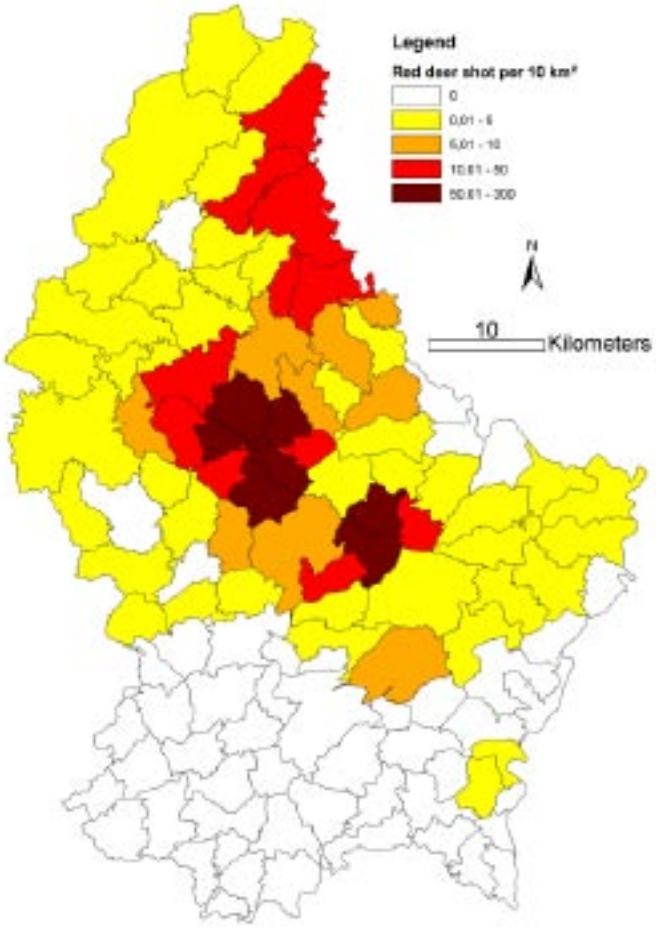


Fig. 2. Geographic distribution of the red deer killed in Luxembourg over the period 1990-2004 (hunted animals and road kills).

One of these factors and a major problem relating to the interpretation of our data is that, since 1989, hunters are only allowed to shoot as many red deer as they have permits. Because distribution of permits is strictly confidential, we could not relate this parameter to the hunting bag data. However, it is known that permits are not distributed in a uniform manner, but according to the assumption of presence of red deer as well as very rough abundance estimates, based on information by hunters as well as local officials (foresters) from the *Administration des Eaux et Forêts*. Before 1989, hunters were allowed to shoot as many red deer as they wanted. Despite being less detailed than subsequent data, hunting bag statistics from that time confirm the geographic distribution of our own analysis (Anonymous 1983-1988). We therefore conclude that the geographic distribution shown by our killed red deer data is probably a decent reflexion of the distribution of the species in Luxembourg.

Interestingly, the two centrally located distribution areas coincide, albeit roughly, with the core distribution area of another large ungulate, the wild boar *Sus scrofa* (L., 1758) (Schley 2000). In view of the species' potential to cause serious damage to agriculture and forestry plantations at high population densities (Hespeler 1999, Koubek & Zima 1999), the situation of the red deer should be closely monitored over the coming years.

It is not known whether the three distribution hotspots of red deer are part of one large population, or indeed separate small populations, although the former option would seem by far the more likely scenario. On the other hand, there are persistent rumours about illegal introductions of red deer to areas of Luxembourg where they had not occurred on a permanent basis previously. For these two reasons, a genetic study of the red deer populations of Luxembourg and the neighbouring regions of Belgium, France and Germany would be useful in contributing to elucidate the status and origin of the red deer in Luxembourg.

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