Hystrix, (n.s.) 11 (2) (2000): 75-78

DISTRIBUTION OF THE EASTERN COTTONTAIL *SYLVILAGUS FLORIDANUS* IN THE PROVINCE OF ALESSANDRIA

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ABSTRACT - The Eastern cottontail, a lagomorph native to the American continent, was introduced to N-Italy in the mid-1960s. In subsequent years a rapid territorial expansion and a remarkable demographic increase has been observed in many areas. In the province of Alessandria, NW Italy, we used night-time censuses with spotlights and road mortality assessment to evaluate the diffusion of the species and its trend. Night-time censuses were performed each year in spring and in autumn along 51 transects which were 10 km long on average. Road deaths were extracted from our 6715 records regarding 85 species of mammals, birds and reptiles found dead along the roads. The distribution area expanded markedly from the 1980s, and the expansion persisted between 1996 and 1997, while in 1998 the area failed to increase further, settling at around 620-660 km^2. The species is not present, at the moment, in the entire Apennine sector nor in the eastern and southern plains. The densities reach maximum values of 2.5-2.75 inddividuals/10 ha. From the road-death data we found a progressive increase of the Eastern cottontail, its proportion of the total mammals rising from 2.2% in 1995 to 3.7% in 1996 and 6.0% in 1997.

Key Words: Eastern cottontail, *Sylvilagus floridanus*, night-time census, road mortality, area expansion, NW Italy.

INTRODUCTION

The Eastern cottontail, *Sylvilagus floridanus*, is a lagomorph native to the American continent, located in three quarters of the United States, except for the west. It can also be found in **a** small portion of southern Canada, all of Mexico, some of Central America, and the northern tip of South America. The species was introduced to Italy, more precisely to the province of Turin, in the mid-1960s (Mussa, 1996). In subsequent years, there were releases in many other zones, which resulted in a rapid territorial expansion and a remarkable demographic increase. However, little is known on current distribution in Italy and on the densities reached in different areas. The aim of this work was to assess the diffusion of the Eastern cottontail in the province of Alessandria, NW Italy, and to evaluate whether their density is increasing or is stable.

MATERIAL AND METHODS

We used two methods to evaluate the diffusion of the species within the province: night-time censuses with spotlights and road deaths.

Night-time censuses

Two censuses were performed each year, in spring (March) and in autumn (October), along 10-km-long transects on average. The area illuminated by the spotlights extended up to 100 m from the vehicle. The data are expressed as densities (ind./10 ha). With this method, we carried out censuses in 51 different zones. The Eastern cottontails were mainly found in edge environments between woody vegetation and open land, although its range of habitats includes meadows, orchards, farmlands, hedgerows and areas with second growth shrubs, vines and low deciduous trees. In the study areas hunting activity was precluded from February to November, local associations of hunters utilised the territory for game production in the wild (mainly Pheasants *Phasianus colchicus* and Hares *Lepus europaeus;* Eastern cottontail excluded), then in December-January game species were captured and transferred to the hunting areas of the province.

Road deaths

From 1995, throughout the provincial territory, data (locality, date, species) were collected regarding 85 species of mammals, birds and reptiles found dead along the roads. Data were collected on roads crossing both hunting-precluded and hunting-allowed areas. The database contains 6715 records, of which 168 relate to the Eastern cottontail. To minimise the effect of behavioural and phenological differences between taxa, we compared the number of killed cottontails with that of all killed mammals (N= 4293), and with the two most sampled mammal species, the hedgehog *Erinaceus europaeus* and the cat *Felis catus*. The data are expressed as percentages (Eastern cottontails/total dead animals x 100).

RESULTS

The Eastern cottontail was found in the northern part of the province (Fig. 1), in the Casalese, Valenzano and Monferrato sectors. The distribution area expanded markedly between 1996 and 1997, while in 1998 it failed to increase further, settling at around 620-660 km^2. The species is not present, at the moment, in the entire Apennine sector nor in the eastern and southern plains.

The densities are rather high (maximum values 2.5-2.75 ind./10 ha, mean 0.43), but are always less than those of the Hare, that in the same censused areas showed a mean density of 1.56 ind./10ha (range 0.12 - 5.5).

Useful information was provided by the road-death data. For each year we analysed samples of around 2300 animals belonging to various species, of which 1383 in 1995, 1573 in 1996 and 1337 in 1997 were mammals. We found a progressive, significant increase of the Eastern cottontail (Fig. 2), its proportion over total mammals rising from 2.2% in 1995 to 3.7% in 1996 and 6.0% in 1997 (X^2= 25.6, d.f.= 2; P<0.01). A similar trend was found by comparing the Eastern cottontail to the two most sampled mammal species, the hedgehog (520, 692 and 526 dead hedgehogs from 1995 to 1997) and the cat (472, 458 and 391 dead cats from 1995 to 1997). As for total cottontails/total mammals comparison, the three years significantly differed in number both for cottontails/hedgehogs (X^2= 26.1, d.f.= 2; P<0.01) and cottontails/cats data (X^2= 33.5, d.f.= 2; P<0.01).

The road-deaths were mostly observed in the coldest months, from December to March (Fig. 3). On the contrary, during the period of demographic increase, from March-April to the summer months, a low value of road-deaths was reported.

DISCUSSION

In the 1980s the Eastern cottontail was very localised in the Alessandria province (Prigioni *et al.*, 1992). The results here reported reveale that the species is now widely

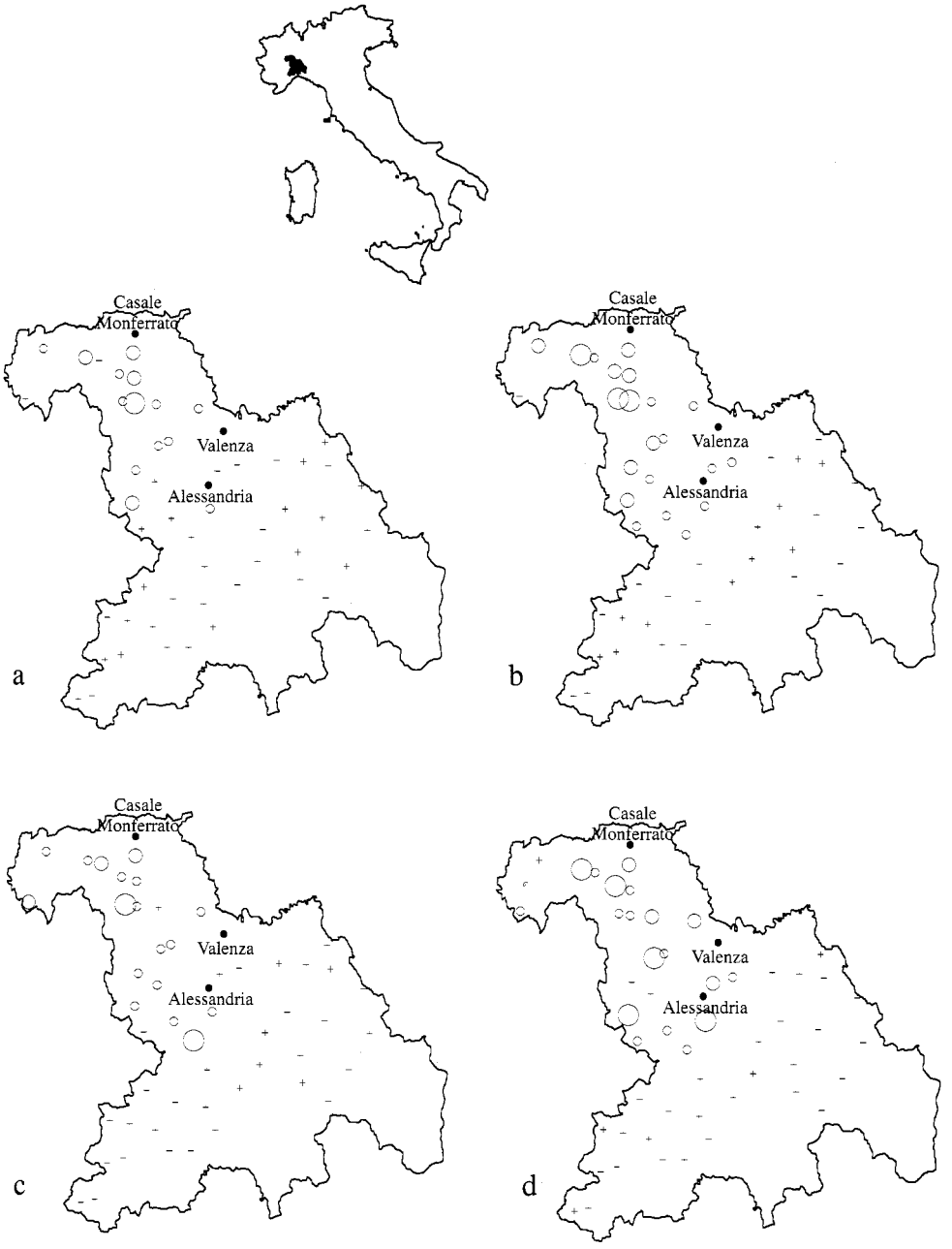

Figure 1 - Location of the 51 areas in which censuses were performed. The density and the distribution of the Eastern cottontail respectively in autumn 1996 (a), spring 1997 (b), autumn 1997 (c) and spring 1998 (d) are represented. Population densities are in proportion to circle size: small, 0.01-0.5 ind./10 ha; medium, 0.5-1 ind./10 ha, large, 1-2.75 ind./10 ha; +, absent species.

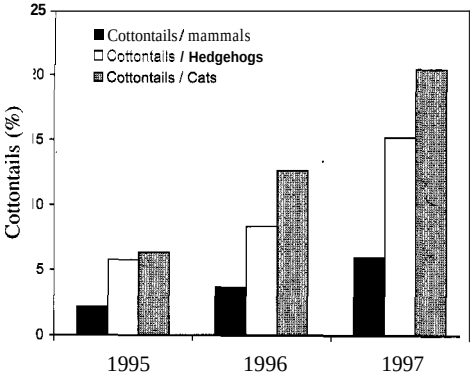

Figure 2 - Percentage of Eastern cottontails compared to the total number of mammals, hedgehogs and cats, found dead along the road.

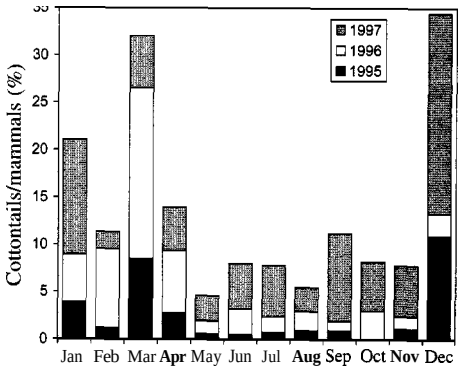

Figure 3 - Monthly percentage of Eastern cottontails found dead along the road compared to the total number of mammals dead in the same way.

distributed, the area of presence concerning about one third of the province. However, when the two more recent years are compared our data show that the species seems to be in a phase of deceleration of its territorial expansion. Nevertheless, its numbers within the areas of the province that it occupies are still significantly increasing. This would suggest that in the years to come the Eastern cottontail could continue to spread in the Alessandria area (unpubl. obs. 1998). The high values of road-deaths during the winter months probably indicates that cottontails tend to increase their movements in the cold months, thus enhancing their chances of crossing a road, while in spring and summer the individuals are established for breeding (Chapman *et al.*, 1982) and so probably they move less. However, the exact reason of the observed higher winter mortality is still unknown and should be further investigated.

In conclusion, our results clearly depict the expansion of the Eastern cottontail in the Alessandria province, and constitute a base for the planning of future management interventions regarding the species. It would be interesting to evaluate the amount of competition with other species (hare and Wild rabbit) and its possible role as a vector in the diffusion of pathologies (Jacobson *et al.*, 1978).

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