

Spatial use and interaction of the raccoon dog (*Nyctereutes procyonoides*) and the red fox (*Vulpes vulpes*) in central Europe – competition or coexistence?

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Introduction

Invasive alien species have many ecological effects and may threaten biological diversity. They can alter habitat, and prey on or compete with native fauna (e.g., Ebenhard, 1988; Hulme, 2007; Vilà et al., 2010). The raccoon dog is native to eastern Asia, but was introduced as a fur game species to the western parts of the Soviet Union in the 1930s-1950s. It is widespread in Northern and Eastern Europe, is still spreading in Central Europe (Drygala et al., 2010) and was recently listed in the top 100 most damaging invasive species in Europe by the DAISE project (<http://www.europealiens.org/speciesTheWorst.do>).

Between June 2004 and September 2006, we carried out a telemetry study in the intensively used agricultural landscape of northeast Germany (Mecklenburg-Western Pomerania, district of Güstrow) into inter-specific interference competition between red foxes and raccoon dogs. The non-native raccoon dog has been present throughout the area since the end of the 1990s. This is the first investigation on potential interaction of the two canids in Central Europe.

Materials and methods

We used VHF-telemetry to record 6.627 location data from 15 red foxes and 20 raccoon dogs during the 28 month field study project. 23 stable home ranges (both MCP 100 and Kernel analyses) were calculated. We analysed home range sizes, home range overlap, interaction and habitat indices use using ArcView GIS 3.2a and Ranges6 v1.2.

Results

The average annual home range sizes based on 23 seasonal home ranges (95% kernels) of red foxes and raccoon dogs were 177.22 ± 36.82 ha (n=10) and 161.09 ± 74.62 ha (n=13), respectively. The home ranges of the two species overlapped by up to 93% (Figure 1).

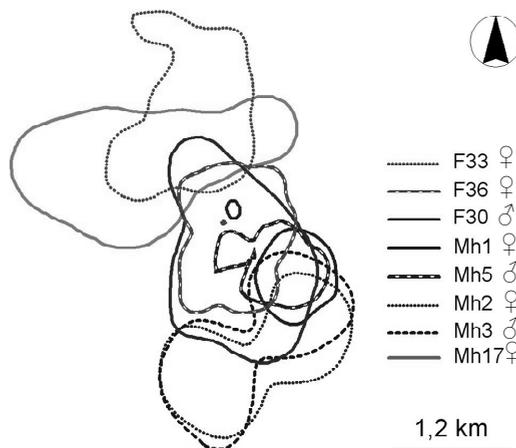


Fig. 1 Home range shape (K95) and overlap for red foxes (F) (n=3) and raccoon dogs (Mh) (n=5)

We found slightly positive intra-specific interaction indices (I_i) (Jacobs, 1974) for red fox ($I_i=0.12$) and raccoon dog ($I_i=0.13$) but a neutral inter-specific interaction index ($I_i=0.01$). There was a significant ($p=0.03$) difference between intra- and inter-specific interaction pattern. On the basis of estimated home range sizes and reproduction and mortality rates a population density of 3.1 red foxes/ km² and 3.4 raccoon dogs/km² was calculated in autumn. The raccoon dog differed significantly ($p<0.05$) from the red fox in its use of habitat types (H_{p_i} =habitat preference index), with preference of dense vegetation cover ($H_{p_i}=0.66-0.8$) and avoidance of open areas ($H_{p_i}=-0.58--0.79$). The red fox displayed significantly less preference for or avoidance of specific habitat types ($H_{p_i}=-0.33-0.27$). Unlike those of the red fox, the home ranges of the raccoon dog shifted significantly with changes in habitat type and state. Areas of maize and rape were only used intensively when the crops offered sufficient cover.

Discussion

The population densities of both species are very high by international standards, and seem to result from the abundance of resources and different use of habitats that reflected both differences in food preferences and morphologically-determined differences in hunting and feeding strategies between species. There was no evidence of strong interference competition between the two canids. However, VHF- telemetry may not reveal specific behaviour patterns and predation of red fox on raccoon dogs (esp. juveniles) and vice versa, as recorded in Eastern Germany (Drygala unpublished data).

References

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