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Original investigation

Seasonal activity patterns and movements of the raccoon dog, a vector of diseases and parasites, in southern Finland

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Abstract

Activity patterns and movements of raccoon dogs (*Nyctereutes procyonoides*) were studied in Virolahti, southeast Finland, in 2000–2003. Activity data were compared to those collected from Evo, south-central Finland, in 1990–1993. Activity in winter was compared to weather (temperature and snow depth), day length and moon. Also circadian activity rhythm was studied in Evo. Raccoon dogs moved fastest in late winter after winter dormancy and slowest in autumn before settling in their winter dens. In March, males were moving more often than females. Raccoon dogs stayed usually in their dens in mid-winter (December–February) but were sometimes wandering around also during the harshest months of the year and changed their winter den on average three times. Both day length and weather affected the activity of raccoon dogs in winter. Animals usually stayed in their dens, when temperature was below −10 °C, snow depth > 35 cm and day length < 7 h and were moving around, when temperature was > 0 °C, there was no snow and day length was > 10 h. Day length and snow depth together predicted rather well the probability of animals being active during winter. Although raccoon dogs were more often active at night than during the light hours, they also showed rather much diurnal activity.

Key words: *Nyctereutes procyonoides*, activity, movements, diseases, Finland

Introduction

The raccoon dog (*Nyctereutes procyonoides*) is an alien species in Europe, introduced to the western parts of the former Soviet Union in the first half of the 20th century (Lavrov 1971; Helle and Kauhala 1991). It is the only member of the Canid family showing winter lethargy in areas where winters are harsh (Kauhala and Saeki 2004) and stores large fat reserves before winter sleep (Kauhala 1993). Females come into oestrus after awaking from winter lethargy, usually in March (Helle and Kauhala 1995). Most pups are born in May after 9 weeks pregnancy. Pups remain in the den for about 6 weeks, males spending more time with them at the den than females (Kauhala et al. 1998). Pups start to move with their parents usually in late June or early July. Dispersal of juveniles starts in August,

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most juveniles leaving their natal home range in September or October (Kauhala et al. 1993).

Raccoon dog is a vector of some dangerous diseases and parasites. The role of the raccoon dog as a vector of rabies has increased in recent years, especially in the Baltic States; in Estonia about 50% of wildlife rabies cases are today found in raccoon dogs (WHO 2004). During rabies epizootic in Finland in the late 1980s raccoon dog was the main vector/victim of the disease (Westerling 1991). Also canine distemper has been observed in raccoon dogs (Machida et al. 1993). Moreover, raccoon dogs are potential vectors of the dangerous parasite, *Echinococcus multilocularis*, since some infected raccoon dogs have been found in Germany. *E. multilocularis* is spreading northwards in Europe and is now found as far north as in Estonia (Moks et al. 2005). Raccoon dogs are also reservoirs and vectors of other parasites, such as *Sarcoptes scabiei* (Shibata and Kawamichi 1999; Ninomiya and Ogata 2005) and *Trichinella* spp. (Oksanen et al. 1998; Oivanen et al. 2002).

The present study is part of a larger project, the aim of which is to collect ecological data (density, home ranges, habitat use, activity patterns, movements and contacts between individuals) of a carnivore community in southeast Finland in order to calculate rabies models for northeast Europe. In this study we investigate the activity patterns and movements of raccoon dogs in different seasons. We also compare the activity of animals in winter with some environmental factors (weather, day length, moon).

Material and methods

Study areas

The main study area (ca. 54 km^2) was located to Virolahti, southeast corner of Finland (60 °32′N, 27 °41′E; Fig. 1). The area is a mosaic of small coniferous and mixed forests, tiny patches of deciduous forest and large fields bordered by wide ditches. Reed beds along the seashore are typical to the area. A small village is located in the middle of the area. The mean temperature of the year during the study was 4.8 °C, −6.3 °C in January and 18.8 °C in July. The ground was covered with snow from late November or December, depending on the year, until mid-April. The mean snow depth in January–March was 25 cm (range 3–49 cm), the mean depth at the end of March being 14 cm. Raccoon dogs were hunted in the area.

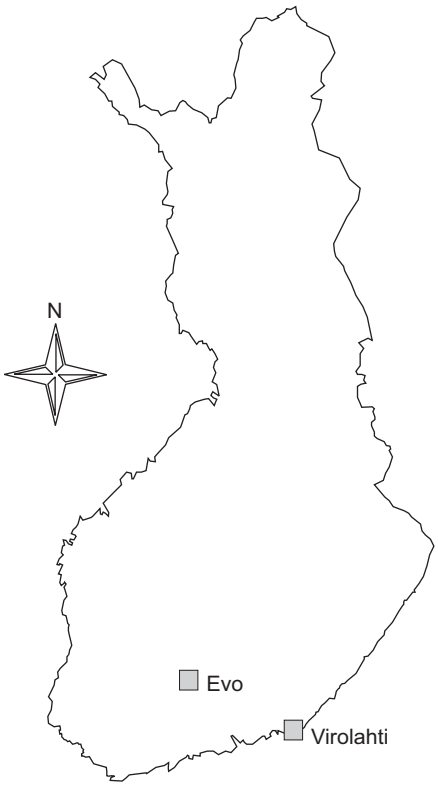

Fig. 1. Study areas in Finland.

The other study area (120 km^2) was located to Evo, south-central Finland (61 °14 °N, 25 °10′E). It consists mainly of coniferous forest with many small lakes and streams, some clear-cuts and small pine swamps but only few fields. The mean temperature of the year was 2.6 °C, −5.2 °C in January and 16.4 °C in July. Snow covers the earth usually from late November until late April, the mean snow depth at the end of March being 25 cm, indicating later thaw in Evo than in Virolahti. Raccoon dogs were not hunted in the area.

Radio tracking

Activity patterns and movements of raccoon dogs were studied using radio-telemetry in 2000–2003 in