

NOBANIS - Invasive Alien Species Fact Sheet

Nyctereutes procyonoides

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Species description

Scientific names: *Nyctereutes procyonoides*, (Gray, 1834) *Canidae*.

Synonyms: *Canis procyonoides*

Common names: Raccoon dog (GB), Marderhund (DE), Mårhund (DK), Kährikkoer (EE), Supikoira (FI), Chien viverrin (FR), Marðarhundur (IS), Usûrinis ūuo (LT), Jenotsuns (LV), Mårdhund (NO), Jenot (PL), Enotovidnaya sobaka (RU), Собака енотовидная (RU), Mårdhund (SE).



Fig. 1. *Nyctereutes procyonoides*, photo by R. Kowalczyk.



Fig. 2. *Nyctereutes procyonoides*, photo by R. Kowalczyk.

Species identification

Nyctereutes procyonoides is the size of a fox, but with shorter legs and tail. A relatively elongated body, small head with a short and sharply pointed muzzle and short rounded ears are typical. *N. procyonoides* is about 30-50 cm high, with a body length of 50-70 cm. Weight about 4-6 kg in summer and 6-13 kg in late autumn. The tail is about 13-25 cm.

A black facial mask covers the eyes and cheeks. Body colouration varies from yellow to grey or reddish. The chest, throat, legs and feet are blackish-brown, black hairs on the back, shoulders and dorsally on the tail. In winter the fur is thick with long guard hairs. In summer the animal looks much slimmer (Ward and Wurster-Hill 1990, Kauhala and Saeki 2004a).

Native range

The natural range of raccoon dogs covers large parts of China, north-east Indochina, Korea, eastern Siberia (Amur and Ussuri regions), Mongolia and Japan (Ward and Wurster-Hill 1990, Kauhala and Saeki 2004a).

Alien distribution

History of introduction and geographical spread

From 1929 to the mid-1950s *N. procyonoides ussuriensis* was introduced as a fur game species to the European part of the former Soviet Union, Siberia, Middle Asia (Kazakhstan, Kyrgyzstan) and Caucasus of the former Soviet Union (Lavrov, 1946). First introduced animals originated from the Amur and Ussuri regions of the former Soviet Union (Morozov, 1953, Rall and Kritskaya, 1953). Later, raccoon dogs were captured and translocated from successfully settled populations to new areas. *N. procyonoides* has adapted very well to habitats in Eastern Europe and quickly spread to the northern- and western parts. Raccoon dogs first invaded Finland in 1935, reached Sweden in 1945-46, then Romania in 1952, Poland in 1955, Slovakia in 1959, Germany, and Hungary in 1961-62, Austria 1962, France 1979, Norway in 1983, and Switzerland 1997 (Nowak and Pielowski 1964,

Artois and Duchêne 1982, Lever 1985, Kauhala 1996a, Weber et al. 2004). It was brought to Estonia in 1950 where it spread very fast. *N. procyonoides* also invaded Estonia from Leningrad and Pihkva regions and from Latvia (Kull *et al.* 2001).

Pathways of introduction

Large scale deliberate introduction (Nowak and Pielowski 1964). In some areas (*e.g.* in Hungary), some populations were probably created from animals escaping from fur farms or captivity (Heltai *et al.* 2000).

Alien status in region

In some areas (*e.g.* in Finland, Baltic countries), *N. procyonoides* is the most common carnivore. It is widespread and common in Finland, Poland, Belarus, Latvia, Lithuania, Estonia, Ukraine, western Russia and Germany. The species is rare, but with an increase in numbers in Sweden and Denmark (see also table 1). It occurs also in Czech Republic, Slovakia, Hungary, Bulgaria, Serbia, Moldova, and Romania. It is sporadically seen in Austria, Bosnia, France, Netherlands, Norway (first breeding observed in 2005, R. Andersen, pers. com.), Slovenia and Switzerland (Mitchell-Jones *et al.* 1999, Kauhala and Saeki 2004a). Some raccoon dogs have also been seen in the eastern Alps in Italy (P. Genovesi, in press).

Country	Not found	Not established	Rare	Local	Common	Very common	Not known
Austria			X				
Belarus					X		
Belgium							X
Denmark				X			
Czech Republic					X		
Estonia						X	
European part of Russia					X		
Finland						X	
Faroe Islands	X						
Germany					X		
Greenland	X						
Iceland	X						
Latvia					X		
Lithuania					X		
Netherlands		X					
Norway		X					
Poland					X		
Slovakia							X
Sweden			X				

Table 1. The frequency and establishment of *Nyctereutes procyonoides*, please refer also to the information provided for this species at www.nobanis.org/search.asp. Legend for this table: **Not found** –The species is not found in the country; **Not established** - The species has not formed self-reproducing populations (but is found as a casual or incidental species); **Rare** - Few sites where it is found in the country; **Local** - Locally abundant, many individuals in some areas of the country; **Common** - Many sites in the country; **Very common** - Many sites and many individuals; **Not known** – No information was available.

Ecology

Habitat description

Raccoon dogs prefer meadows and moist deciduous and mixed forests with abundant understorey, river valleys, lakeshores, marshes, and moist heath (Kauhala 1996b, Jędrzejewska and Jędrzejewski 1998, Kauhala and Auttila 2010). They may also occupy a mosaic of woodland and agricultural area (Drygala *et al.* 2000).

Reproduction and life cycle

Raccoon dogs achieve sexual maturity at 9-11 months. Females can deliver young annually. Mating occurs from February to April, usually in March (Helle and Kauhala 1995). The gestation period is nine weeks, and cubs are born from April to June. In Japan litter size is smaller (4-5 young/litter) than in the Russian Far East and in the introduced area in Europe (mean 7-9 young/litter, max 16) (Judin 1977, Helle and Kauhala 1995, Kauhala 1996c, Kowalczyk *et al.* 2000, Kauhala and Saeki 2004b). The proportion of breeding females in the population averages 80% (Helle and Kauhala 1995). Climatic conditions (especially the length of the summer) and food availability may influence reproductive output (Kauhala and Helle 1995). The Raccoon dog are strictly monogamous and both the female and the male helps out with rearing the young (Kauhala 1992).

Dispersal and spread

In the period from 1935 to 1984 *N. procyonoides* has colonised 1.4 million km² of Europe by secondary expansion (Nowak 1984). This is the result of their great plasticity in adaptation to various climatic and environmental conditions, their ability to hibernate in winter, high reproductive capacity, high migratory ability and limited control and thus effective gene flow between populations (Pitra *et al.* 2010).

Most juveniles disperse at 4-5 months of age (August-October). Average dispersal distance does not exceed 20 km (Kauhala and Helle 1994) in areas of high population density, but a dispersion distance over 700 km in the search for a mate has been reported (Erik Lund, pers comm.).

Impact

Affected habitats and indigenous organisms

N. procyonoides are opportunistic omnivores. Their food niche is much wider than those of most other carnivores. Diet composition of *N. procyonoides* varies geographically and is mainly influenced by availability of food resources (Sutor *et al.* 2010). Ungulate and other carcasses and amphibians play a main role in raccoon dog diet in forest areas, plant material, small mammals and invertebrates in woodland and farmland mosaic, waterfowl, amphibians and plant material on marshlands, lake shores and small islands (Kauhala *et al.* 1993, 1998, Jędrzejewska and Jędrzejewski 1998, Drygala *et al.* 2000, Sidorovich *et al.* 2000, Kauhala and Auniola 2001, Baltrūnaitė 2002).

Raccoon dogs have been reported to cause severe damage to waterfowl colonies in Estonia (refs in Kauhala (1996a), Kull *et al.* 2001). It may also be a serious predator of tetraonid birds (V. Sidorovich, pers. comm.), although this was not supported by a predator removal study in Finland (Kauhala *et al.* 2000). *N. procyonoides* may become a threat to bird and frog populations, particularly on islands (Kauhala 1996a). As reported by Kauhala and Auniola (2001), in summer 2-67% of raccoon dog faeces contained waterfowl (mainly eider) remains, but most probably a major part of them was found as carcasses and raccoon dogs were estimated to kill only 1.2-3.5% of brooding female eiders in the Finnish archipelago each year. Rather many scats (11-40%) contained egg shells. Many egg shells were found even in the scats in July after eider chicks had hatched. The

predatory impact may differ from area to area, depending on food availability and the local fauna composition (Kauhala and Auniola 2001).

N. procyonoides are omnivorous carnivores and may potentially compete with native species such as red fox (*Vulpes vulpes*) and badger (*Meles meles*). In some areas, raccoon dogs (which are very efficient scavengers; Selva 2004), may affect densities of other generalist carnivores by decreasing the availability of carrion, an important feeding resource especially in late winter/early spring (Sidorovich *et al.* 2000).

N. procyonoides often settle in badger setts in winter and during the reproduction season (Kowalczyk *et al.* 2000, 2008). This may lead to disease and parasite transmission. Raccoon dogs are important carriers of rabies, sarcoptic mange, *Echinococcus multilocularis* and trichinellosis (Oivanen *et al.* 2002, Westerling 1991). In Finland an association between the density of *N. procyonoides* and the incidence of infection with *Trichinella* sp. larvae of the European lynx (*Lynx lynx*) has been demonstrated (Oksanen *et al.* 1998). *N. procyonoides* are also often killed by other carnivores (*e.g.* wolves and dogs, R. Kowalczyk, unpubl. data), which creates a risk of disease transmission to these carnivores.

Genetic effects

No reported genetic effects. The raccoon dog is the only member in its genus. Thus, it is very unlikely that it hybridizes with other species.

Human health effects

N. procyonoides is one of the main vector of rabies in Europe. In the 1990s in Poland, Lithuania, Latvia and Estonia, from 7 to 16% of all rabies cases were found in raccoon dogs. In Estonia, > 50% of wildlife rabies cases were found in raccoon dogs in 2004. In 1999-2004 in Poland over 700 raccoon dogs (*i.e.* 8 % of all cases) with rabies were recorded. During rabies epizootic in Finland in late 1980s, 77% of the cases identified were in raccoon dogs (Westerling 1991).

Raccoon dogs are potential vectors of *Echinococcus multilocularis*, a parasite dangerous for humans (Thiess *et al.* 2001).

Economic and societal effects (positive/negative)

Apart from being a vector of diseases and parasites, such as rabies and *Echinococcus multilocularis*, no economic impact has been reported. In Finland, raccoon dogs are still being hunted for their fur. The price of the fur has been increasing in recent years.

Management approaches

Prevention methods

N. procyonoides is listed in Recommendation no 77 of the Convention on the Conservation of European Wildlife and Natural Habitats (1999), among other invasive species, which have proved to be a threat to the biological diversity and should be eradicated. Because of their secretive behaviour, it is practically impossible to prevent the expansion of raccoon dogs in Europe. In some countries (*e.g.* in Sweden), the law states that alien species, such as raccoon dogs should not be permitted to establish in the country and may be hunted throughout the year. In other countries (*e.g.* in Denmark) a similar rule is applied specifically for raccoon dog and other species mentioned by name. In Sweden they try to prevent new introductions by regulation of import (The Act on import of living animals, SFS 1994:1830) and in Norway farming of non-native animals requires an exemption from the regulations in the Wildlife Act, and such a permits has not yet been given for

raccoon dogs (Erik Lund, pers. comm.). In Denmark it is prohibited by law to keep raccoon dogs (BEK nr. 720 24/06/2011)

Eradication, control and monitoring efforts

Nowadays Raccoon dogs are seldom hunted for their fur, but rather due to their status as pests in Europe.

In Denmark, Norway, Estonia, Latvia and Lithuania raccoon dogs may be hunted all year round, with no protection during breeding season. In Finland and Poland raccoon dogs are protected during breeding season (in Finland, only females with pups are protected in May-July). In Finland, the annual hunting bag varied between 98,000-172,000 in 1998-2009 (Kauhala and Saeki 2004a, Finnish Game and Fisheries Research Institute 2010), c.a. 20,000 in Germany (S. Schwarz, pers. comm), 6,000-10,000 in Poland (data of Research Station of Polish Hunting Society in Czempin), 4,000-5,000 in Estonia, 3,500-4,000 in Lithuania (L. Baltrūnaitė, pers. comm), and 2,000 in Latvia. In other countries raccoon dogs are hunted occasionally.

Several countries including Denmark, Finland, Norway and Sweden have an action or management plan against *N. Procyonoides*. In Norway the main aim of the action plan is to prevent the species from establishing in Norway (Erik Lund, pers. comm.). A similar aim is found in action plans for other countries as well. In Finland raccoon dogs are already established and therefore the management plan includes objectives that aim to prevent further spread or to control the population size. In Finland it is also prohibited to catch raccoon dogs from the wild for transportation to fur farms due to the risk of rabies (Kaarina Kauhala, pers. comm.).

Locally, intensive trapping with box and wire traps and hunting with dogs may be methods of raccoon dog eradication. Eradication is, however, difficult, because raccoon dogs, like other canines, tend to increase their litter size when hunting pressure on them is high.

Management of the invasive Raccoon Dog (*Nyctereutes procyonoides*) in the north-European countries (MIRDINEC, LIFE09 NAT/SE/ 000344)

An EU LIFE Biodiversity project was carried out in Sweden, Finland and Denmark from September 2010 to August 2013 with Norway participating as co-financier. The overall aim of the project was to prevent the establishment of wild, free-living and viable populations of raccoon dogs in Sweden and Denmark, and to prevent further increase and dispersal of the species in Finland. A number of different actions and means was planned and implemented during the project. One activity was by the *early warning system* (EWS) to monitor changes in the population. The EWS consists of a number of game cameras distributed in dispersing areas. Game cameras are also used effectively in the process of verification of reported observations. Another activity is based on the social behaviour of raccoon dogs and their strong instinct for searching for a mate. By tagging raccoon dogs with GPS and VHF transmitters and then tracking the animal, it is possible to lead hunters to other individuals. Tagged individuals were sterilized before release preventing further reproduction. The method with tagged animals – called Judas animals – has shown to be very efficient.

Hunting with dogs and with different kinds of traps is used both for culling and tagging animals. Education and information to hunters, local communities and others was also one of the main activities in the project, both in order to spread knowledge about the raccoon dog in common, but also to make people report their observations of the animals. Voluntary hunters helped out with observations, trapping, guiding, capturing of animals, building of e.g. traps and artificial dens and more. During the project many observations were registered and animals have been trapped and culled. The species has so far not been eradicated from the project areas, but through the project the goal that no confirmed observations of raccoon dog in new areas compared with the situation before the LIFE+ project started has been accomplished.

Information and awareness

Information on the distribution and spread of *N. procyonides*, and especially on its impact on native fauna is urgently needed.

Public information on raccoon dogs is very scarce. Some countries have prepared reports on alien species. Some information is available on the internet (see Links). In Estonia the Ministry of Environment has published two booklets introducing invasive alien species of local importance (in 2001 and 2005). An electronic database on invasive alien species has also been created, available at www.envir.ee. The purpose of those booklets is to make the wider range of people aware of the problems going hand-in-hand with the spread of invasive species.

In the LIFE+ project MIRDINEC it was an on-going task to contribute to information about raccoon dogs, and leaflets and posters was produced as a part of this. Also education and information to hunters and the public in general was arranged within the project. This has contributed to a public awareness on the problem with this specific invasive alien species, as has been shown by the many observations the project has received from the public on the tips-telephone and by e-mail.

Knowledge and research

The species is the subject of ecological research projects in Japan, Finland, Poland and Germany. These studies have focused on home-range size, habitat use, social organization, activity, diet, the impact of raccoon dogs on native fauna and (in Finland) their role as a vector of diseases (rabies) and parasites. However, still little is known on distribution, densities, interactions with other animals, and the impact of raccoon dogs on native fauna.

Recommendations or comments from experts and local communities

The raccoon dog will continue its expansion in Europe and will increase in numbers in some areas where populations have been established. Raccoon dogs may benefit from the warming of climate (long winters limit their distribution). A nationwide monitoring program for raccoon dogs is recommended. It should focus on distribution and role of raccoon dog in ecosystems, as a vector of diseases and parasites, and its impact on native fauna (diet analysis, predation/competition impact estimates), especially in nesting areas of waterfowl and other bird species.

The raccoon dog should be controlled in every country where it is non-native. Immediately after verified cases of its occurrence in a country it should be included on list of game species and persecuted. It is necessary to draw hunters and managers attention to the problem. Bait vaccinations against rabies should be done in areas where there is a risk that raccoon dogs will bring the disease to the area. In these areas hunting is not the solution to the problem, because high hunting pressure may accelerate the movements of individuals and create an unstable, increasing raccoon dog population where disease transmission is likely. However, as stated above, raccoon dog is an omnivore (not a skilful hunter) and the scientific evidence of its impact *e.g.* to waterfowl is limited, though it may cause damage locally.

References and other resources

Contact persons

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Links

Alien species in Poland – [fact-sheet](#)

Large Herbivore network – [fact sheet](#)

DAISIE – [fact sheet](#)

Animal Diversity Web – [Michigan University, Zoological museum](#)

IUCN Red List of Threatened Species [on *Nyctereutes procyonoides*](#)

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