RAPID RISK ASSESSMENT SUMMARY

Updated: September 2015

Raccoon Dog (*Nyctereutes procyonoides*)

- Fox sized mammal with black-grey fur, short legs and tail (unlike raccoon).
- Not established in GB, but sightings of individuals have been reported.
- Available in GB through pet trade.
- May affect native wildlife and game through predation and competition.
- Carrier of several zoonotic diseases including rabies.
- One of the top 100 invasive species in Europe.

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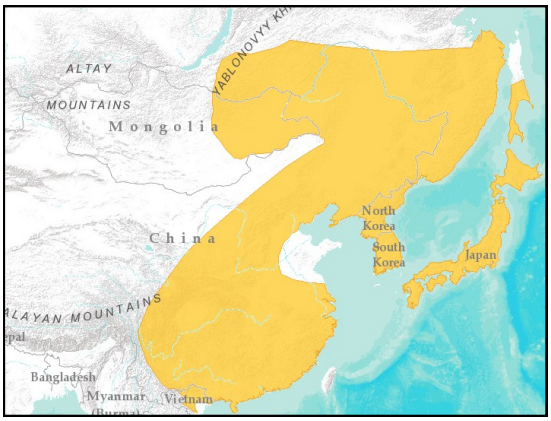
History in GB

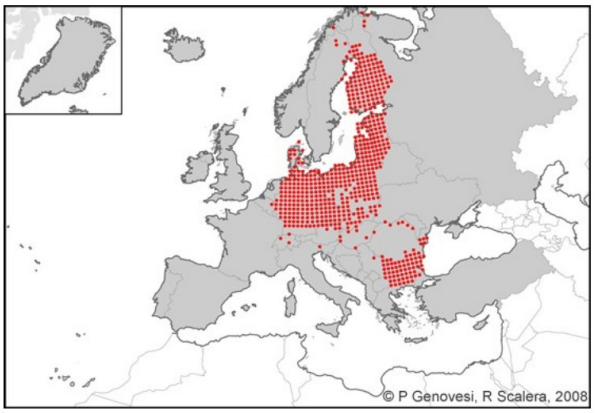
There have been two sightings in GB: a roadkill near Loch Lomond (Scotland) in the 1990s, and more recently in Berkshire in 2005. Unconfirmed sightings have also been recorded in 2006, but the species could not be identified and no photographic evidence is available. Raccoon dogs are sold openly as pets over the internet in GB and are kept in some wildlife parks and zoos.

Native distribution



Source: IUCN Redlist, 2015

Distribution in EU



Source: DAISIE 2015

Impacts

Environmental

- Important predator of small vertebrates of conservation concern (birds and amphibians), and game species.
- May also compete with native carnivores for den sites and carrion, which may result in range shrinkage of some native species with marginal populations and limited food supply (e.g red foxes, and badgers in the Scottish highlands).

Economic

- Raccoon dogs are a vector for rabies. There are economic costs associated with this, e.g. treating them with oral rabies vaccinations.

Social

- Vector for a range of zoonotic diseases such as rabies, *Echinococcus multilocularis* and *Trichinella* species.

Introduction pathways

Pet trade - most likely route of entry, individuals are available online from a number of sellers in GB.

Hitchhikers - possible due to the high prevalence of raccoon dogs in continental Europe, and the high volume of freight being transported to the UK .

Spread pathways

Natural - highly mobile; average dispersal distance is approximately 20km per year. Spread widely across their introduced European range within 50 years.

Human - may be spread further within GB through the pet trade.

Summary

	Risk	Confidence
Entry	**LIKELY**	**HIGH**
Establishment	**MODERATELY LIKELY**	**MEDIUM**
Spread	**INTERMEDIATE**	**HIGH**
Impacts	**MODERATE**	**HIGH**
Conclusion	**MEDIUM**	**HIGH**

Information about GB Non-native Species Risk Assessments

The Convention on Biological Diversity (CBD) emphasises the need for a precautionary approach towards non-native species where there is often a lack of firm scientific evidence. It also strongly promotes the use of good quality risk assessment to help underpin this approach. The GB risk analysis mechanism has been developed to help facilitate such an approach in Great Britain. It complies with the CBD and reflects standards used by other schemes such as the Intergovernmental Panel on Climate Change, European Plant Protection Organisation and European Food Safety Authority to ensure good practice.

Risk assessments, along with other information, are used to help support decision making in Great Britain. They do not in themselves determine government policy.

The Non-native Species Secretariat (NNSS) manages the risk analysis process on behalf of the GB Programme Board for Non-native Species. Risk assessments are carried out by independent experts from a range of organisations. As part of the risk analysis process risk assessments are:

- Completed using a consistent risk assessment template to ensure that the full range of issues recognised in international standards are addressed.
- Drafted by an independent expert on the species and peer reviewed by a different expert.
- Approved by an independent risk analysis panel (known as the Non-native Species Risk Analysis Panel or NNRAP) only when they are satisfied the assessment is fit-for-purpose.
- Approved for publication by the GB Programme Board for Non-native Species.
- Placed on the GB Non-native Species Secretariat (NNSS) website for a three month period of public comment.
- Finalised by the risk assessor to the satisfaction of the NNRAP.

To find out more about the risk analysis mechanism go to: www.nonnativespecies.org

Common misconceptions about risk assessments

To address a number of common misconceptions about non-native species risk assessments, the following points should be noted:

- Risk assessments consider only the risks posed by a species. They do not consider the practicalities, impacts or other issues relating to the management of the species. They therefore cannot on their own be used to determine what, if any, management response should be undertaken.
- Risk assessments are about negative impacts and are not meant to consider positive impacts that may also occur. The positive impacts would be considered as part of an overall policy decision.
- Risk assessments are advisory and therefore part of the suite of information on which policy decisions are based.
- Completed risk assessments are not final and absolute. Substantive new scientific evidence may prompt a re-evaluation of the risks and/or a change of policy.

Period for comment

Draft risk assessments are available for a period of three months from the date of posting on the NNSS website*. During this time stakeholders are invited to comment on the scientific evidence which underpins the assessments or provide information on other relevant evidence or research that may be available. Relevant comments are collated by the NNSS and sent to the risk assessor. The assessor reviews the comments and, if necessary, amends the risk assessment. The final risk assessment is then checked and approved by the NNRAP.

*risk assessments are posted online at:
https://secure.fera.defra.gov.uk/nonnativespecies/index.cfm?sectionid=51
comments should be emailed to nnss@apha.gsi.gov.uk

Rapid Assessment of: *Nyctereutes procyonides* (Raccoon Dog)
Author: Sugoto Roy

Version: Final (April 2016) – Draft 1 (March 2012), Peer Review (March 2013), NNRAP 1st review (June 2012) Draft 2 (August 2014), NNRAP 2nd review (September 2014)
Signed off by NNRAP: September 2014
Approved by Programme Board: September 2015
Placed on NNSS website: November 2015

GB Non-native species Rapid Risk Assessment (NRRA)

Introduction:

The rapid risk assessment is used to assess invasive non-native species more rapidly than the larger GB Non-native Risk Assessment. The principles remain the same, relying on scientific knowledge of the species, expert judgement and peer review. For some species the rapid assessment alone will be sufficient, others may go on to be assessed under the larger scheme if requested by the Non-native Species Programme Board.

1 - What is the principal reason for performing the Risk Assessment? (Include any other reasons as comments)

Response: *Horizon scanning has identified this species as a potential risk to Great Britain.*

2 - What is the Risk Assessment Area?

Response: *Great Britain*

3 - What is the name of the organism (scientific and accepted common; include common synonyms and notes on taxonomic complexity if relevant)?

Response:

Names: A suite of local names, and a complex taxonomy with a number of different subspecies

Nyctereutes procyonides (Gray 1834), also known as *Canis procyonides*, raccoon dog, raccoon like dog, Tanuki (Japanese), Marderhund (German), Mardhund (Scandinavia), Supikoira (Finland)(Kowalczyk 2006)..

The species also has a complex taxonomy. With a number of different subspecies being found across its native range of East Asia, and Japan. Subspecies include *N. procyonides procyonides* (mainland China), *N.p.viverrinus* (Japan), *N.p.ussuriensis* (Russian Far East), *N.p.koreensis* (Korea), *N.P. orestes* (eastern China). The Japanese subspecies has recently been further divided into two, *N.p. alba* and *viverrinus*, with the former being found only in Hokkaido (Ohdachi, Ishibashi et al. 2009).

4 - Is the organism known to be invasive anywhere in the world?

Response: yes

The species is invasive across northern and Eastern Europe, particularly in Scandinavia, and part of the former Soviet Union. Populations have been well-established through deliberate introduction since the late 1920s (Kauhala and Kowalczyk 2011), and the species has now spread into Poland, Germany, Finland, Latvia and Lithuania. Swedish populations are now also growing (Kowalczyk 2006).

5 - What is the current distribution status of the organism with respect to the Risk Assessment Area?

Response: Only two confirmed sightings in the UK. Can be found for sale in the pet trade.

There have been two sightings, these include a roadkill in the Highlands of Scotland in the 1990s (Loch Lomond), and more recently one in Berkshire in 2005 (www.naturalengland.org.uk and (Baker and Hills 2008)). Although unconfirmed sightings have also been recorded in 2006, the species could not be identified and there is no photographic evidence available. It should be noted that raccoons and raccoon dogs can look remarkably similar (Ohdachi, Ishibashi et al. 2009), and feral raccoons are more prevalent (but not established) in the UK. It should also be noted that raccoon dogs are occasionally found for sale as pets(www.preloved.co.uk › Pets and Livestock › Dogs).

6 - Are there conditions present in the Risk Assessment Area that would enable the organism to survive and reproduce? Comment on any special conditions required by the species?

Response: The species could survive easily and does not need special conditions

Raccoons dogs are generalists. The have a broad omnivorous diet, and through a combination of predation, scavenging and frugivory, they can make use of food of very poor quality (Kauhala, Kaunisto et al. 1993; Kauhala and Auniola 2001; Sutor, Kauhala et al. 2010). They have small home ranges (for example 125ha in Japan, 125 ha, http://vege1.kan.ynu.ac.jp/isp/pdf/Abe_et_al_raccoon.pdf) as they can sustain themselves on calorific import food due to their omnivorous habits. They can live in most habitat types, surviving in scrub and small hedges and woodland (Kauhala 1996; Kauhala and Auttila 2010; Kauhala, Schregel et al. 2010). They can also tolerate extremes of temperature by entering an extreme lethargic state (pseudo-hibernation) in the winter, and tolerating high temperatures in the summer (Mustonen, Asikainen et al. 2007). As a result they have established populations across continental Europe. Thus they do not need special conditions in order to survive, and it is probable that they would survive very well in Britain where food is readily available in the form of wild prey and refuse (providing scavenging opportunity), and suitable habitat is readily available in the form of back gardens, amenity land and green space.

7 - Does the known geographical distribution of the organism include ecoclimatic zones comparable with those of the Risk Assessment Area or sufficiently similar for the organism to survive and thrive?

Response: The GB climate is well within the ranges found in its current distribution

The species is highly invasive in northern and eastern Europe, and is native in eastern Asia and Japan. Over much of its current distribution the climate is similar to that in GB. As a result there is a high degree of ecoclimatic comparability between the risk assessment area and its current distribution(Kowalczyk 2006).

8 - Has the organism established viable (reproducing) populations anywhere outside of its native range (do not answer this question if you have answered 'yes' to question 4)?

Response: n/a

9 - Can the organism spread rapidly by natural means or by human assistance?

Response: Yes, it is highly mobile and also is sold as a pet in the UK

The species has the ability to disperse several tens of kilometres following escape over its lifetime (Kauhala

1996; Holmala and Kauhala 2006; Kauhala and Kowalczyk 2011). Indeed the Latin name *Nyctereutes* means night-time wandere (www.wikipedia.org). Within a given population, several individuals show little site fidelity and not territorial, moving to where food is most abundant from season to season.(Kauhala and Kowalczyk 2011). There are also records of the species being sold as a pet through the Internet (*www.preloved.co.uk › Pets and Livestock › Dogs*).

10 - Could the organism itself, or acting as a vector, cause economic, environmental or social harm in the Risk Assessment Area?

Response: Yes, important predator of small vertebrates of conservation concern (birds and amphibians), and game species.

The species is an important predator of game birds, game mammals, and small vertebrates of conservation concern such as amphibians, birds and small mammals.

The species is also an important factor of diseases such as rabies, trichinella, toxocara sp, and a wide range of parasites and zoonoses that could affect humans, livestock, domestic animals and native wildlife species alike. As a result the species poses an environmental, economic, and health threat (Sterbetz 1971; Frolich, Streich et al. 2005; Holmala and Kauhala 2006; Zienius, Sereika et al. 2007; Singer, Kauhala et al. 2009; Bruzinskaite-Schmidhalter, Sarkunas et al. 2012; Kameo, Nagao et al. 2012; Okulewicz, Perec-Matysiak et al. 2012).

Entry Summary

Estimate the overall likelihood of entry into the Risk Assessment Area for this organism (comment on key issues that lead to this conclusion).

Response: *likely*

Confidence: *high*

Comments (include list of entry pathways in your comments):

The reason for this choice is that the species is still sold in the UK through the pet trade as discussed above – this is the most likely route of entry. A brief search of the internet (August 2014) found: 8 different sellers across England (mainly individual breeders but also an online store) selling 10s of racoon dogs (exact number unspecified in many cases); prices ranged from £150 to £400; all adverts were recent (i.e. had been placed within 21 days of the search date). In addition, at least 5 different wildlife parks stocked raccoon dogs.

In addition, it is possible that hitchhikers could arrive due to the high prevalence of the species in continental Europe, combined with the high volume of freight being transported to the UK.

Establishment Summary

Estimate the overall likelihood of establishment (comment on key issues that lead to this conclusion).

Response: *moderately likely*

Confidence: *medium*

Comments (state where in GB this species could establish in your comments, include map if possible):

The species, due to its broad habitat requirements and omnivorous diet is highly adaptable and could easily establish a population in the UK. The only factors limiting this is the fact that sufficient numbers may not arrive simultaneously to enable breeding (although it is common to keep animals in groups rather than single individuals and so the risk is still moderately likely). Also, the species is not particularly illusive and populations living in and around human habitation would be easily discovered (Ohdachi, Ishibashi et al. 2009). It could hypothetically establish populations across the GB.

Spread Summary

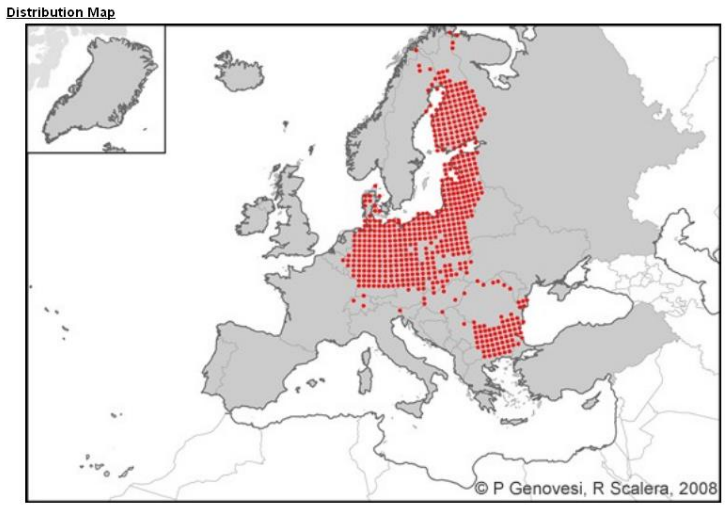
Estimate overall potential for spread (comment on key issues that lead to this conclusion).

Response: *intermediate*

Confidence: *high*

Comments (include list of spread pathways in your comments):

The average dispersal distance is approximately 20km per year, which is within the range found for a carnivore of this size (Sutherland, Harestad et al. 2000). Dispersal begins when individuals are 5 months old. Also the species has spread across much of its huge introduced range within a 50 year period (see map below)



Distribution map of *N. procyonides*, taken from www.europe-aliens.org,

The species may be spread further through human agency within the GB as it is already a small but regular part of the pet trade.

Impact Summary

Estimate overall severity of impact (comment on key issues that lead to this conclusion)

[Delete accordingly]

Response: *moderate*

Confidence: *high*

Comments (include list of impacts in your comments):

The species has impacts in the following areas:

- Direct impacts on native wildlife and game species. The species has a very broad diet. It is a predator of brown hare levrets (a UK BAP species) and there are direct correlations of raccoon dog populations and the decline in hare numbers (Kauhala, Helle et al. 1999). Similar trends have also been seen in game birds such as grouse (Kauhala, Helle et al. 2000), though this is limited. The raccoon dogs will also hunt small vertebrates such as microtine rodents, amphibians and birds, and can cause localized extinction of frog populations (Kauhala and Auniola 2001; Kauhala and Kowalczyk 2011).

- Raccoon dogs may also compete with native carnivore species for den sites and carrion (Goszczynski 1999; Kauhala and Kowalczyk 2011). Where native species have marginal populations with a limiting food supply, this may result in range shrinkage of some native species for example red foxes *Vulpes vulpes* and badgers *Meles meles* in the Scottish highlands.

- Disease impact. The raccoon dog is an important reservoir and vector for a range of zoonotic diseases such as rabies, *Echinococcus multilocularis* and *Trichinella* species – which is the major driver for management action in its invasive range in Europe. It is often found with high parasite loads in the continent. This is an area where the species will have its highest impacts, spreading diseases to humans, livestock, domestic animals and wild mammals (Kauhala and Kowalczyk 2011; Sutor, Schwarz et al. 2011).

Climate Change

What is the likelihood that the risk posed by this species will increase as a result of climate change?

Response: *low*

Confidence: *medium*

Comments (include aspects of species biology likely to be effected by climate change (e.g. ability to establish, key impacts that might change and timescale over which significant change may occur):

Although raccoon dogs are able to withstand extreme cold by becoming dormant, one of the few carnivores to do so, long periods of cold can limit their productivity and eventual population growth. They can also withstand high temperatures, and face wide extremes of both within their native and introduced range. Therefore it can be assumed alterations in climate will not effect their spread very much, and that shorter winters and potentially warmer temperatures may have a beneficial effect on the spread of the species (Kowalczyk 2006).

Conclusion

Estimate the overall risk (comment on the key issues that lead to this conclusion).

Response: *medium*

Confidence: *high*

Comments:

Raccoon dogs are sold openly as pets over the internet. This coupled with the fact that populations are growing in continental Europe and in some areas have reached high density populations means that there is athe potential for the species to be smuggled into GB, or escape from captivity. The limiting factor in this is the fact that only single individuals are likely to escape at any one time.

They would be able to survive in GB as climatic conditions fall well within the extremes found in the native and current introduced range. They have a broad diet and broad habitat requirements and could easily find sufficient food to sustain a population.

They can have impacts directly on native wildlife through predation, and indirectly through competition. However, the largest impacts are likely to be seen through disease transmission to humans, domestic animals and wildlife.

Management options (brief summary):

1 - Has the species been managed elsewhere? If so, how effective has management been?

Response:

There is widespread control of the species in continental Europe. Some countries, e.g. Finland and Poland, afford the species protection during the breeding season for humaneness reasons. The species is hunted all year round in Norway, Estonia, Lithuania and Latvia (Kowalczyk 2006).

Eradication has not been achieved however. Mainly due to a density dependent compensatory breeding whereby litter sizes increase when the species is culled(Helle and Kauhala 1995).

2 - List the available control / eradication options for this organism and indicate their efficacy.

Response:

The species is hunted by shooting, sometimes with the assistance of dogs. It is also easily trapped in live capture box traps, and snares. Den sites, particularly during the winter dormancy periods are easy to locate using dogs. Unregulated poisoning is carried out on an ad hoc basis by some farmers in Finland and Poland. http://naturstyrelsen.dk/media/nst/9457496/laymansreport.pdf

3 - List the available pathway management options (to reduce spread) for this organism and indicate their efficacy.

Response:

Improved vigilance and biosecurity at ports would reduce the likelihood of animals entering the country illegally.

Improved monitoring of the pet trade, particularly the internet pet trade is also highly important, and would enable authorities to maintain a high level of monitoring of the buying and selling of animals and where suppliers are based. This, coupled with an effort to collate the data on the number of captive animals currently present in the country would enable the rapid detection of escapees in the wild and allow them to be removed from the wild quickly before population establishment. Prohibition on keeping outside licensed zoological collections or only keeping under licence are likely to be the best way of reducing the possibility of the species becoming established in the wild.

4 - How quickly would management need to be implemented in order to work?

Response:

Monitoring the pet trade and collating information on existing breeders and domestic individuals is a critical first step and is something that could be implemented rapidly. This is in keeping with the precautionary principle of prevention is better than cure. Eradication would need to be undertaken as soon as possible and ideally within the first few years of an established population being discovered.

References

Provide here a list of the references cited in the course of completing assessment

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