

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@fera.gsi.gov.uk

GB NON-NATIVE ORGANISM RISK ASSESSMENT SCHEME

For more information visit: www.nonnativespecies.org

	Name of Organism	<i>Nasua nasua</i> - Coati mundi	
	Objectives:	Assess the risks associated with this species in GB	
	Version:	Original draft 26/09/11	
	Author:	Simon Baker	
	Suggested citation:	Baker, S. (2011). GB Non-native Organism Risk Assessment for <i>Nasua nasua</i> . www.nonnativespecies.org	
N	QUESTION	RESPONSE	COMMENT
1	What is the reason for performing the Risk Assessment?		Request by the GB Programme Board for Non-native Species
2	What is the Risk Assessment area?	Great Britain	
3	Does a relevant earlier Risk Assessment exist?	NO OR UNKNOWN (Go to 5)	
4	If there is an earlier Risk Assessment is it still entirely valid, or only partly valid?		
	Stage 2: Organism Risk Assessment		
	SECTION A: Organism Screening		
5	Identify the Organism. Is the organism clearly a single taxonomic entity and can it be adequately distinguished from other entities of the same rank?	NO (Go to 6)	
6	If not a single taxonomic entity, can it be redefined?	YES (Go to 7)	Coati - For the purpose of this risk assessment the name 'coati' is deemed to cover two very similar species of the genus <i>Nasua</i> : the Brown-nosed or Ring-tailed Coati (<i>Nasua nasua</i> Linnaeus, 1766) and the White-nosed Coati (<i>Nasua narica</i> Linnaeus, 1766) - Procyonidae - Carnivora - Mammal - Chordata - Animalia. The name Coati mundi is sometimes used to describe these species, this is based on the incorrect early assumption that the solitary males were a separate species. The third species in the genus, <i>Nasua nelsoni</i> is restricted to Cozumel Island, Mexico, is smaller than the other two species and not specifically included in this assessment.
7	Is the organism in its present range known to be invasive, i.e. to threaten species, habitats or ecosystems?	YES (Go to 9)	Is invasive but to a limited extent. Has devastated the vegetation and aviflora of Robinson Crusoe island in the Juan Fernandez archipelago off the coast of Chile (Lever 1985). Along with other nest predators it has been implicated in the absence of many bird species on Anchieta Island of the coast of Brazil (Galetti et al 2009) where it was introduced. Is not recorded as an Invasive Alien Species by the IUCN Global Invasive Species Database (2009) and only in Chile through the Inter-American Biodiversity Information Network (I3N) (2009)
8	Does the organism have intrinsic attributes that indicate that it could be invasive, i.e. threaten species, habitats or ecosystems?		
9	Does the organism occur outside effective containment in the Risk Assessment area?	NO (Go to 11)	There were a number of sightings of coati in the Lake District from 2004 to 2006. At least 3 animals were accounted for; one tranquilized in Lindale (2006), one shot near Barrow in Furness (2005), one captured in a chicken pen in Haverthwaite (2004) (A O'Connor pers comm.). The origin is unconfirmed but they are all within 10km of the South Lakes Wild Animal Park, which had a large colony. Widely kept in captivity worldwide with ISIS members holding over 1100 (ISIS 2009). In addition to those killed or captured from the Lake District, coati have been recorded out of captivity in England and Wales at least 7 times between 1970 and May 2006 (Baker 2008).
10	Is the organism widely distributed in the Risk Assessment area?		
11	Does at least one species (for herbivores, predators and parasites) or suitable habitat vital for the survival, development and multiplication of the organism occur in the Risk Assessment area, in the open, in protected conditions or both?	YES (Go to 12)	Coatis are omnivores and although they are classified as primarily insectivorous but also fond of fruit (Russell 1984). They are clearly very adaptable in their feeding habits. A study by Alves-Costa et al (2004) in southeastern Brazil showed that in a sample of faeces collected over 3 years: 85% included plant parts, 76% insects, 54% millipedes, 49% fruits, 34% spiders, 10% organic refuse, vertebrates 95% and gastropods 3%. In Atlantic forests 90% of the diet is obtained by arboreal foraging for insects in bromeliads (Beisiegel 2001 - quoted by Australian Government 2009). A range of potential food is available in the wild and coati will take domestic poultry and raid gardens and bird feeders (NatureServe 2009, Hass 2002).

12	Does the organism require another species for critical stages in its life cycle such as growth (e.g. root symbionts), reproduction (e.g. pollinators; egg incubators), spread (e.g. seed dispersers) and transmission, (e.g. vectors)?	NO (Go to 14)	
13	Is the other critical species identified in question 12 (or a similar species that may provide a similar function) present in the Risk Assessment area or likely to be introduced? If in doubt, then a separate assessment of the probability of introduction of this species may be needed.		
14	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?	YES (Go to 16)	There is a degree of comparability between the southern most part of the native range of <i>N. nasua</i> (ranges shown in Emmons & Helgen 2008) and the Risk Assessment area. The species has also been found at altitudes for example in southwestern USA in oak woodlands or hardwood riparian canyons from 1,400-2,300m (Samudio et al 2008). The ecoclimatic zones found in the areas where there are introduced viable populations coincides with the native tropical and sub-tropical ecoclimatic zones found over the native range of the species. The species appears to have survived for some time out of captivity in the UK Lake District during the winter period. It would appear to be able to at least survive for some period in more temperate climates although there is no evidence of breeding out of captivity or ability to thrive in the Risk Assessment area.
15	Could the organism establish under protected conditions (e.g. glasshouses, aquaculture facilities, terraria, zoological gardens) in the Risk Assessment area?		
16	Has the organism entered and established viable (reproducing) populations in new areas outside its original range, either as a direct or indirect result of man's activities?	YES (Go to 17)	Introduced to Chilean Island of Robinson Crusoe after 1935 and had established a population of between 2,500 and 5,000 by 1976 (Lever, 1985). Introduced to Anchieta island just off the coast of Brazil in 1983 and have subsequently thrived (Boventhorp & Galetti 2007). Also introduced in 5 counties in Florida (FWCC 2009). However, otherwise no known introduced viable populations.
17	Can the organism spread rapidly by natural means or by human assistance?	YES (Go to 18)	Widely kept in captivity with zoos that are ISIS members holding over 1100 (ISIS 2009). Coatis have been recorded out of captivity in England and Wales at least 10 times; 7 times between 1970 and May 2006 (Baker 2008) and 3 times in the Lake District between 2004 and 2006 (A O'Connor pers comm). Not known to have bred out of captivity in the Risk Assessment area.
18	Could the organism as such, or acting as a vector, cause economic, environmental or social harm in the Risk Assessment area?	YES OR UNCERTAIN (Go to 19)	Has attacked poultry when out of captivity in this country (O'Connor, pers. comm). On Robinson Crusoe Island has had a significant impact on bird populations and flora (Lever 1985). Coatis <i>Nasua nasua</i> were, along with 15 other species of mammal, introduced to Anchieta Island, just off the coast of Brazil (Boventhorp & Galetti 2007), in 1983. Here there is strong evidence that, along with two other nest predators (Agoutis and opossums), they were responsible for the absence of many bird species on the island (Galetti et al 2009). Coatis were released in Florida and have been recorded since 1928. They have now had apparently self sustaining populations in 4 counties in the state for over 10 years. Their impact on native species is unknown (FWCC 2009). Populations are susceptible to mange (Valenzuela et al 2000), carry a variety of ectoparasites with evidence that there may be interchange with domestic cats and dogs in Brazil (Rodrigues et al 2006). They are susceptible to canine distemper (Hass & Valenzuela 2002) and rabies (Kaufmann et al 1976).
19	This organism could present a risk to the Risk Assessment area and a detailed risk assessment is appropriate.	Detailed Risk Assessment Appropriate GO TO SECTION B	Yes
20	This organism is not likely to be a harmful non-native organism in the Risk Assessment area and the assessment can stop.		

B SECTION B: Detailed assessment of an organism's probability of entry, establishment and spread and the magnitude of the economic, environmental and social consequences				
Probability of Entry		RESPONSE	UNCERTAINTY	COMMENT
1.1	List the pathways that the organism could be carried on. How many relevant pathways can the organism be carried on?	few - 1	LOW - 0	Widely kept in captivity with zoos that are ISIS members holding over 1100 (ISIS 2009). Coatis have been recorded out of captivity in England and Wales at least 7 times between 1970 and May 2006 according to Baker 2008, and a total of 10 times when the animals subsequently known to have been accounted for in the Lake District are included (A O'Connor, pers comm).
1.2	Choose one pathway from the list of pathways selected in 1.1 to begin the pathway assessments.	Escapeses from zoos and other animal collections.		Coati were removed from the Schedule of the Dangerous Wild Animals Act by the Dangerous Wild Animals Act 1976 (Modification) (No.2) Order 2007. They are not yet commonly kept as pets within the risk assessment Area but this recent change in legislation could potentially change this.
1.3	How likely is the organism to be associated with the pathway at origin?	very likely - 4	LOW - 0	Widely kept in captivity, with zoos worldwide that are ISIS members holding over 1100 (ISIS 2009). In December 2007, 12 collections in Great Britain that are members of the British and Irish Association of Zoos and Aquariums (BIAZA) recorded keeping a total of 71 <i>Nasua nasua</i> and 6 <i>Nasua narica</i> (pers com from BIAZA from their Mammals Inventory 2007). ISIS records (ISIS 2009) showed 4 additional collections (presumably not members of BIAZA) holding a further 22 coati. The total held in Great Britain is unknown but the species is clearly one commonly kept in wildlife collections open to the public. The number of coatis kept by private individuals is unknown but they are not thought, at present, to be held in large numbers, although they are for sale via the internet in the Risk Assessment Area.
1.4	Is the concentration of the organism on the pathway at origin likely to be high?	unlikely - 1	LOW - 0	
1.5	How likely is the organism to survive existing cultivation or commercial practices?	moderately likely - 2	LOW - 0	Two of the escaped coati were accounted for when raiding domestic poultry. This renders them susceptible to being killed or captured by poultry keepers.
1.6	How likely is the organism to survive or remain undetected by existing measures?	unlikely - 1	LOW - 0	Dissimilar to native species, diurnal and likely to need to rely on domestic activity (poultry, crops, food on bird tables) to survive so unlikely to remain undetected for long, as illustrated by a series of newspaper reports accompanying the escapes in the Lake District (O'Connor pers comm)
1.7	How likely is the organism to survive during transport /storage?	very likely - 4	LOW - 0	A popular species in zoos and is regularly bred in captivity. Very low probability of being transported unintentionally.
1.8	How likely is the organism to multiply/increase in prevalence during transport /storage?	N/A		
1.9	What is the volume of movement along the pathway?	minimal - 0	LOW - 0	Coati have been recorded out of captivity in England and Wales at least 10 times between 1970 and 2006 (Baker 2008, A O'Connor pers comm). The total number of animals involved was 12: nine single animals and one occasion when 3 escaped.
1.10	How frequent is movement along the pathway?	rarely - 1	LOW - 0	Coati have been recorded out of captivity in England and Wales at least 10 times between 1970 and 2006 (Baker 2008 & A O'Connor pers comm). The total number of animals involved was 12: nine single animals and one occasion when 3 escaped. This would give an annual average minimum new occurrence out of captivity about once in every 3-4 years. It is unlikely that many escapes would go unreported but the rate of escapes would be likely to change if keeping practices or the frequency with which they were held in captivity changed.
1.11	How widely could the organism be distributed throughout the Risk Assessment area?	moderately widely - 2	LOW - 0	Coatis are a tropical and sub tropical species but there is a degree of comparability between the southern most part of the native range of <i>N. nasua</i> (ranges shown in Emmons L. & Helgen K 2008) and the Risk Assessment area. The species has also been found at altitudes for example in southwestern USA in oak woodlands or hardwood riparian canyons from 1,400-2,300m (Samudio et al 2008). The species appears to have survived for some time out of captivity in the UK Lake District during the winter period. It would appear to be able to at least survive for some period in more temperate climates although there is no evidence of breeding out of captivity or ability to thrive in the Risk Assessment area. Government guidance on keeping coati in Northern Ireland requires that heating is provided in den or nest box areas when the temperature falls below 4 degrees centigrade (Northern Ireland Environment Agency 2004). Unlikely to survive in urban areas or uplands above the tree line.
1.12	How likely is the organism to arrive during the months of the year most appropriate for establishment ?	likely - 3	MEDIUM - 1	Coatis have been confirmed out of captivity in December so can probably survive for at least a period at any time of the year although it is unlikely that they would thrive in the wild in the winter in the Risk Assessment area.
1.13	How likely is the intended use of the commodity (e.g. processing, consumption, planting, disposal of waste, by-products) or other material with which the organism is associated to aid transfer to a suitable habitat?	N/A		
1.14	How likely is the organism to be able to transfer from the pathway to a suitable habitat?	moderately likely - 2	LOW - 0	The species does escape from captivity but not as frequently as some other species e.g. Raccoon or red-necked wallaby (Baker 2008).

	Probability of Establishment	RESPONSE	UNCERTAINTY	COMMENT
1.15	How similar are the climatic conditions that would affect establishment in the Risk Assessment area and in the area of current distribution?	slightly similar - 1	LOW - 0	The great majority of the coat's native range is tropical or sub tropical, between the tropics of Cancer and Capricorn, but they can be found at higher altitudes within this area so there is some, limited, similarity with some of the climatic conditions in the Risk Assessment area. There is a degree of comparability between the climate in the southern most part of the native range of <i>N. nasua</i> (ranges shown in Emmons & Helgen 2008) and the Risk Assessment area. The species has also been found at altitudes for example in southwestern USA in oak woodlands or hardwood riparian canyons from 1,400-2,300m (Samudio et al 2008). Government guidance on keeping coat in Northern Ireland requires that heating is provided in den or nest box areas when the temperature falls below 4 degrees centigrade (Northern Ireland Environment Agency 2004). However, the species appears to have survived for some time out of captivity in the UK Lake District during the winter period. It would appear to be able to at least survive for some period in more temperate climates although there is no evidence of breeding out of captivity or ability to thrive in the Risk Assessment area.
1.16	How similar are other abiotic factors that would affect establishment in the Risk Assessment area and in the area of present distribution?	slightly similar - 1	LOW - 0	Main factors for a medium sized terrestrial mammal are likely to be biotic and climatic.
1.17	How many species (for herbivores, predators and parasites) or suitable habitats vital for the survival, development and multiplication of the organism species are present in the Risk Assessment area? Specify the species or habitats and indicate the number.	moderate number - 2	MEDIUM - 1	Coatis are omnivores and although they are classified as primarily insectivorous but also fond of fruit by Russell (1984) they are clearly very adaptable. A study by Alves-Costa <i>et al</i> (2004) in southeastern Brazil showed 45% of the diet was plant material (fruits, berries, flowers, shoots and tubers), 40% invertebrates (insects, millipedes, spiders, molluscs) and 15% vertebrates (lizards, frogs, rodents, birds). In Atlantic forests 90% of the diet is obtained by arboreal foraging for insects in bromeliads (Beisiegel 2001).
1.18	How widespread are the species (for herbivores, predators and parasites) or suitable habitats vital for the survival, development and multiplication of the organism in the Risk Assessment area?	frequent - 3	MEDIUM - 1	The habitats used in their native range most similar to those in the Risk Assessment area are: cropland/hedgerow, woodland (coniferous, hardwood and mixed), scrub (NatureServe 2009). They also live on the urban fringe and in low density development in Florida (FFWCC 2009). This could potentially account for much of the Risk Assessment area apart from areas such as uplands, wetlands and urban areas.
1.19	If the organism requires another species for critical stages in its life cycle then how likely is the organism to become associated with such species in the risk	N/A		
1.20	How likely is it that establishment will not be prevented by competition from existing species in the Risk Assessment area?	likely - 3	LOW - 0	There may be some competition from badgers (<i>Meles meles</i>) and foxes (<i>Vulpes vulpes</i>) both of which are omnivorous and a similar size but coati will can be arboreal and are diurnal.
1.21	How likely is it that establishment will not be prevented by natural enemies already present in the Risk Assessment area?	likely - 3	MEDIUM - 1	Badgers (<i>Meles meles</i>) and foxes (<i>Vulpes vulpes</i>) are the only the only native species that might try and take the adults but the not dissimilar size (3.5 - 5.6 kg; Russell 1984) would make this unlikely. There could be predation of juveniles as they are born very poorly developed (100-180 gm; Russell 1984), are kept in nests in trees at first, joining female troops at 5-6 weeks old (Hass 2002).
1.22	If there are differences in man's management of the environment/habitat in the Risk Assessment area from that in the area of present distribution, are they likely to aid establishment? (specify)	very unlikely - 0	LOW - 0	They are likely to be best adapted to woodland or scrub and man's management has significantly reduced these habitats compared to within their native range.
1.23	How likely is it that existing control or husbandry measures will fail to prevent establishment of the organism?	likely - 3	MEDIUM - 1	Protection of poultry and game keeping may impact on the species but are unlikely to alone prevent establishment.
1.24	How often has the organism been recorded in protected conditions, e.g. glasshouses, elsewhere?	occasional - 2	LOW - 0	It is found in captivity in zoological collections. In December 2007, 12 collections in Great Britain that are members of the British and Irish Association of Zoos and Aquariums (BIAZA) recorded keeping a total of 71 <i>Nasua nasua</i> and 6 <i>Nasua narica</i> (pers com from BIAZA from their Mammals Inventory 2007). ISIS records (ISIS 2009) showed 4 additional collections (presumably not members of BIAZA) holding a further 22 coati. The total held in Great Britain is unknown but the species is clearly one commonly kept in wildlife collections open to the public. The number of coatis kept by private individuals is unknown but they are not thought, at present, to be held in large numbers.
1.25	How likely is the reproductive strategy of the organism and duration of its life cycle to aid establishment?	unlikely - 1	MEDIUM - 1	Has not been recorded breeding out of captivity in the UK or other temperate area so little objective data. However it has a highly specialised social organisation with adult females and juveniles forming bands of up to 30 (more normally about 12) (Emmons & Helgen, 2008; Samudio <i>et al</i> , 2008). Males leave the troop at 2-3 years of age and begin a solitary existence, except during a brief annual mating season. This seems to mostly benefit the juveniles and is unlikely to be able to occur during an establishment phase possibly leaving juveniles vulnerable to predation and weather. Gestation lasts 77 days, young are poorly developed at birth weighing 100-180 g, live in the nest for 5-6 weeks (NatureServe 2009, Russell 1984). Early juvenile mortality rates reported as 43-75%, with adult survival over a 4 year period between 18% and 35% (Hass & Valenzuela 2002). Maximum longevity in captivity recorded as over 17 years (Nowak 1999).
1.26	How likely is it that the organism's capacity to spread will aid establishment?	unlikely - 1	MEDIUM - 1	Home ranges small in tropical forests (0.35 to 0.45 sq km) (Kaufmann 1962) but larger to the north of their range (to 22.4 sq km for troops and 10.7 sq km for solitary males (Haas 2002) which might be expected to be more similar to that in introduced suboptimum habitat. Clearly coati are capable of extensive movements such that dispersal of 10s of kilometres would not be unexpected (NatureServe 2009). Does not seem likely to aid establishment with infrequent escapes.

1.27	How adaptable is the organism?	adaptable - 3	MEDIUM -1	Adaptable in feeding preferences but no information found on how adaptable its social organisation is and how well adapted this would be as an aid to invading new areas.
1.28	How likely is it that low genetic diversity in the founder population of the organism will not prevent establishment?	likely - 3	LOW - 0	Species is likely to develop from a very small founder population but this has not been shown to be a bar to colonisation. Two pregnant females escaped onto Robinson Crusoe Island in 1935 and established a population of 2500 by 1976 (Long 2003).
1.29	How often has the organism entered and established in new areas outside its original range as a result of man's activities?	very few - 0	LOW - 0	Populations established in Florida (FFWCC 2009) and two islands in the Juan Fernandez Group Chile (Robinson Crusoe is one). They are also established on Achieta Island off the coast of Brazil following their release there by a zoo in 1983 (Bovendorp & Galetti 2007). Otherwise there is no known establishment outside native range.
1.30	How likely is it that the organism could survive eradication campaigns in the Risk Assessment area?	unlikely - 1	MEDIUM -1	Coati are threatened in some parts of their range by hunting, are occasionally caught in traps as non-target species and appear to have been locally eradicated by poisoning campaigns directed against coyote. They would appear to be reasonably susceptible to control (Samudio <i>et al</i> 2008).
1.31	Even if permanent establishment of the organism is unlikely, how likely is it that transient populations will be maintained in the Risk Assessment area through natural migration or entry through man's activities (including intentional release into the outdoor environment)?	very unlikely - 0	LOW - 0	No natural migration. At present coati appear to be held almost entirely in Zoos and do not escape from most of these. This assessment would clearly need to be reviewed if this situation changed.

	Spread	RESPONSE	UNCERTAINTY	COMMENT
2.1	How rapidly is the organism liable to spread in the Risk Assessment area by natural means?	slow - 1	LOW - 0	Given a naturally low reproductive rate (annual litter of 4-6, NatureServe 2009) and assuming that any founding population is likely to be no more than one or two females the initial spread of a breeding population is likely to be relatively slow. Their spread is unlikely to be assisted by agencies other than their own intrinsic ability to spread.
2.2	How rapidly is the organism liable to spread in the Risk Assessment area by human assistance?	very slow - 0	MEDIUM -1	Coati are not currently commonly held privately in Great Britain but can legally be kept and small numbers are available through the internet in the Risk Assessment Area. If they became more popular as pets the importance of human assistance could increase.
2.3	How difficult would it be to contain the organism within the Risk Assessment area?	with some difficulty - 2	LOW - 0	Attrition through trapping / recapture would help contain a population but it would only be a relatively effective rather than absolutely effective measure.
2.4	Based on the answers to questions on the potential for establishment and spread define the area endangered by the organism.		MEDIUM -1	Whilst individuals could probably survive in most areas for a period at certain times of the year it is by no means certain that they could establish populations over any of the area because of climatic and biotic constraints. However, coati are flexible omnivores that can take advantage of human activity - poultry, crops, rubbish, bird feeding etc and may be able to supplement natural food in some areas. It is unclear how susceptible they would be to the year round climate in the Risk Assessment area and how successfully they could rear young. They have not naturally expanded north or south from the more tropical areas in the Americas indicating that establishment in the Risk Assessment area could well be problematic. The habitats used in their native range most similar to those in the Risk Assessment area are: cropland/hedgerow, woodland (coniferous, hardwood and mixed), scrub (NatureServe 2009). This could potentially account for much of the Risk Assessment area apart from areas such as uplands, wetlands and urban areas.

	Impacts	RESPONSE	UNCERTAINTY	COMMENT
2.5	How important is economic loss caused by the organism within its existing geographic range?	minimal - 0	LOW - 0	May occasionally eat cultivated crops (Russell 1984) and experience in the UK shows they can predate domestic poultry.
2.6	Considering the ecological conditions in the Risk Assessment area, how serious is the direct negative economic effect of the organism, e.g. on crop yield and/or quality, livestock health and production, likely to be? (describe) in the Risk Assessment area, how serious is the direct negative economic effect of the organism, e.g. on crop yield and/or quality, likely to be?	minimal - 0	LOW - 0	Unlikely to have a significant direct economic impact on agriculture. If population density was ever significant its impact as a vector for disease could be important but this would in most imaginable scenarios be outweighed by the role of native mammals.
2.7	How great a loss in producer profits is the organism likely to cause due to changes in production costs, yields, etc., in the Risk Assessment area?	minimal - 0	MEDIUM -1	Little evidence of its impact in comparable habitat so uncertainty medium.
2.8	How great a reduction in consumer demand is the organism likely to cause in the Risk Assessment area?	minimal - 0	MEDIUM -1	
2.9	How likely is the presence of the organism in the Risk Assessment area to cause losses in export markets?	very unlikely - 0	LOW - 0	
2.10	How important would other economic costs resulting from introduction be? (specify)	minor - 1	LOW - 0	The main costs would be likely to be those of trying to remove an introduced mammal because of the precautionary principle if this became necessary.
2.11	How important is environmental harm caused by the organism within its existing geographic range?	minor - 1	MEDIUM -1	In particular instances, such as its impact on seabirds following introduction to an island, it can cause a problem but over the vast majority of its range it does not cause environmental harm. In Florida where they were introduced they are not considered pests or an invasive species by Government Authorities (Australian Government 2009)
2.12	How important is environmental harm likely to be in the Risk Assessment area?	minor - 1	MEDIUM -1	The species is arboreal and can eat birds eggs, it also uses hollows in trees as den sites so could compete with birds for nest sites. Coatis also impact on seabird colonies in specific situations. However, overall the likely impact of what is most likely to be low population densities at best is likely to be minor.
2.13	How important is social and other harm caused by the organism within its existing geographic range?	minimal - 0	LOW - 0	Coatis can damage crops (rice, cassava, corn and beans) take domestic poultry, can raid gardens and rubbish dumps (Australian Government 2009) but this appears to be at the level of occasional nuisance rather than a significant problem.
2.14	How important is the social harm likely to be in the Risk Assessment area?	minimal - 0	LOW - 0	As above
2.15	How likely is it that genetic traits can be carried to native species, modifying their genetic nature and making their economic, environmental or social effects more serious?	very unlikely - 0	LOW - 0	There are no native members of the family Procyonidae in the Risk Assessment area, the risk of interbreeding is not a factor to consider.
2.16	How probable is it that natural enemies, already present in the Risk Assessment area, will have no affect on populations of the organism if introduced?	likely - 3	MEDIUM -1	May be some predation on young but badgers and foxes are likely not to interact with adults as coati have sharp teeth and claws and are relatively large.
2.17	How easily can the organism be controlled?	with some difficulty - 2	LOW - 0	Some of the most cost effective methods of control (e.g. Poison) are unlikely to be available and control would most likely be by live trapping and shooting. These methods may be reasonably effective against a distinctive medium sized mammal but would have a significant cost, especially if control was required over a large area.
2.18	How likely are control measures to disrupt existing biological or integrated systems for control of other organisms?	very unlikely - 0	LOW - 0	Legal methods will be selective.
2.19	How likely is the organism to act as food, a host, a symbiont or a vector for other damaging organisms?	likely - 3	LOW - 0	Coatis are susceptible to diseases common to carnivores such as: canine and feline distemper, parvo virus, hepatitis, leptospirosis and rabies and are also susceptible to a range of internal and external parasites, particularly mange (Australian Government 2009).
2.20	Highlight those parts of the endangered area where economic, environmental and social impacts are most likely to occur		MEDIUM -1	Poultry keeping, large hole nesting species of bird, suburban gardens with small pets, feeding birds, accessible refuse.

Summarise Entry	moderately likely - 2	LOW - 0	The species has been recorded escaping from captivity (probably zoo / animal collections) a number of times. While zoos, which are regulated, remain the main keepers, the risks of escapes are less than if they are kept by the public as pets. There is an element of standard setting and control of keeping conditions under the Zoo Licensing Act 1976 but no direct controls on keeping of coati by members of the public. The animal collection close to where the coati were regularly found in the Lake District was the subject of interest from the media and licensing authorities and no longer appears to keep coati (whether these factors are connected in this case is unknown but a process to influence outcomes exists for such cases) . Apart from escapes from captivity there are no other likely pathways into the Risk Assessment area.
Summarise Establishment	unlikely - 1	MEDIUM -1	What makes establishment likely is: 1) Adaptable omnivore 2) Little direct competition from native species as they can be arboreal and diurnal. 3) Medium sized mammal so may be able to cope with sub optimum climate What makes establishment less likely is: 1) Relatively low reproductive rate 2) Complex social organisation, groups of females and immatures would be susceptible to discovery, perturbation and difficulty in establishing this is likely to decrease juvenile survival. 3) For much of the year there is little fruit available 4) Escaped coati will be vulnerable to recapture, shooting, traffic accidents, dogs 5) A non tropical climate, severe winters in particular may make survival difficult for adults. 6) They are diurnal making detection and control more likely. 7) They have not expanded their range further northwards or southwards in the Americas indicating some impediment as they move away from the tropics.
Summarise Spread	slow - 1	MEDIUM -1	A quote from NatureServe (2009) sums up the position: ' Dispersal has not been adequately studied, but clearly these mammals are capable of extensive movements such that dispersal of 10s of kilometres would not be unexpected.' However, whilst within their range, dispersal may have biological advantages, it is likely to be a disadvantage for a founding population with a complex social structure and little chance of meeting other individuals. It is likely that the rate of spread of a breeding population would be slow.
Summarise Impacts	minimal - 0	LOW - 0	They appear to have a limited impact in their natural range in environmental, social or economic terms. Where they were introduced to an island it would be surprising if they had not had a substantial impact on nesting seabirds. If they were to become established in this country we might expect them to cause some nuisance but not have a significant economic impact. they might in some situations have an impact on bird populations through their use of hollow trees and arboreal habit allowing egg predation.
For pathway/policy risk assessment Assess the potential for establishment and economic/environmental/social impacts of another organism or stop			
Conclusion of the risk assessment	LOW - 0	MEDIUM -1	There is a clear pathway for the organism to enter the Risk Assessment area and it has done so. However, the species does not have a record of significant environmental, economic or social impact other than in a few very restricted instances. It has not demonstrated the capacity to spread from its substantially tropical native range despite the fact that there are no physical barriers to dispersal south or north in the Americas. This indicates some climate mediated constraints. In its favour as a potential invader it has a flexible omnivorous diet but this advantage is countered by a complex social system and low reproductive rate that is likely to make establishing from a small founder population difficult. On balance the evidence favours a low possibility of the species being able to establish a viable population in the wild in the Risk Assessment area in the authors subjective judgement but with a moderate degree of uncertainty.
Conclusions on Uncertainty		MEDIUM -1	Quite a lot is known about coati but as they have not established widespread populations outside their native range there is a degree of uncertainty in the ability of coati to invade and what their impact may be. This lack of evidence could also count as support for the position that they find it difficult to colonise areas outside their native range. The result is a good degree of uncertainty especially as their diet is omnivorous and flexible and they occupy a range of habitats within their native range.

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