GB NON-NATIVE ORGANISM RISK ASSESSMENT SCHEME

Name of organism: ***Myocastor coypus***
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Risk Assessment Area: European Union (28 Countries)

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EU CHAPPEAU	
QUESTION	**RESPONSE**
1. In how many EU member states has this species been recorded? List them.	Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Luxembourg, Netherlands, Norway, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom (Map in DAISIE website)
2. In how many EU member states has this species currently established populations? List them.	Austria, Belgium, Bulgaria, Croatia, France, Germany, Greece, Italy, Luxembourg, Netherlands, Romania, Slovakia, Slovenia, Spain (Map in DAISIE website). Eradicated from United Kingdom (Gosling & Baker 1989)
3. In how many EU member states has this species shown signs of invasiveness? List them.	It is invasive in Italy, France and Central Europe
4. In which EU Biogeographic areas could this species establish?	According to present distribution the species is already established in the Atlantic, Continental, Mediterranean, Pannonian (?), Biogeographic areas; the establishement in the other Biogeographic areas is not likely
5. In how many EU Member States could this species establish in the future [given current climate] (including those where it is already established)? List them.	Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Switzerland, United Kingdom
6. In how many EU member states could this species become invasive in the future [given current climate] (where it is not already established)?	Spain and Portugal; in Great Britain it was invasive in the past, but it has been eradicated.

SECTION A – Organism Information and Screening		
Stage 1. Organism Information	**RESPONSE [chose one entry, delete all others]**	**COMMENT**
1. Identify the organism. Is it clearly a single taxonomic entity and can it be adequately distinguished from other entities of the same rank?	*Myocastor coypus* Molina, 1782. EN: Coypu; FR: Ragondin; IT: Nutria; D: Nutria; ES: Coipú	Yes, this species can be adequately distinguished from other entities.
2. If not a single taxonomic entity, can it be redefined? (if necessary use the response box to re-define the organism and carry on)	NA	
3. Does a relevant earlier risk assessment exist? (give details of any previous risk assessment)	No	
4. If there is an earlier risk assessment is it still entirely valid, or only partly valid?	NA	
5. Where is the organism native?		South America
6. What is the global distribution of the organism (excluding Europe)?		Coypus are native from South America where they are present in Argentina, Bolivia, Brazil, Chile, Paraguay, Uruguay. Coypu populations are currently established in North America, Central and Eastern Asia including Japan and Korea, Kenya in East Africa, and the Middle East (Carter & Leonard 2002; Bertolino et al. 2012).
7. What is the distribution of the organism in Europe?		Austria, Belgium, Bulgaria, Croatia, France, Germany, Greece, Italy, Luxembourg, Netherlands, Romania, Slovakia, Slovenia, Spain (DAISIE website).
8. Is the organism known to be invasive (i.e. to threaten organisms, habitats or ecosystems)	Yes	Coypus have been introduced and established population in many localities of Europe, North

anywhere in the world?		America, Central and Eastern Asia including Japan and Korea, Kenya in East Africa, and the Middle East (Carter & Leonard 2002; Bertolino et al. 2012). It has been included in the IUCN list of the 100 of the worst invasive species (Bertolino 2009). Coypus are generalist herbivores, which feed on a wide variety of plant materials, including leaves, stems and roots. As a result of this feeding activity, large areas of *Nuphar lutea*, *Rumex* spp., *Sagittaria* spp., *Scirpus* spp., *Phragmites australis*, *Trapa natans*, *Typha* spp., may be eliminated (Ellis 1963; Willner et al. 1979; Boorman & Fuller 1981; Bertolino et al. 2005). Occasionally, coypus might feed on crustaceans and freshwater mussels, but prey are important only locally. In Louisiana (USA) the coypu exerts an important impact on the aboveground biomass of native marsh plant species, such as chairmaker's bulrush, *Scirpus americanus* (Johnson and Foote, 1997) and arrowheads, *Sagittaria latifolia* and *S. platyphylla* (Llewellyn & Shaffer 1993). In Louisiana and Maryland feeding activity of coypu has been associated with the loss of brackish and freshwater marshes through a process known as eatout (Foote & Johnson 1993; Carter et al. 1999). In 2007, estimates of coastwide marsh damaged by coypu feeding activity ranged from 3,400 to 41,500 hectares per year (Louisiana Department of Wildlife and Fisheries 2007). Coypus could impact waterbird breeding success by using their nests as platform for resting and thus crushing or sinking the eggs (Bertolino et al. 2011; Angelici et al. 2012). Competitive exclusion may be taking place between coypu and the muskrat *Ondatra zibethicus* in North America

		(Bertolino et al. 2012).
9. Describe any known socio-economic benefits of the organism in the risk assessment area.	None known	
Stage 2. Screening Questions		
10. Has this risk assessment been requested by the Programme Board? (If uncertain check with the Non-native Species Secretariat)	No	
11. What is the reason for performing the risk assessment?	Identification of invasive alien species of EU concern	
12. Does the organism have intrinsic attributes that indicate that it could be invasive, i.e. threaten species, habitats or ecosystems?		Coypus can breed throughout the year. The age of first parturition is 3-8 months. Prenatal embryo losses (up to 50-60%) and abortion of litters could influence productivity. Mean litter size at birth is 4.5-5.4 (Italy, England). In favourable habitats, females may have 2.7 litters/year with a mean of 15 young/year (Gosling 1981). On average, individuals in introduced populations put on weight more quickly, they reach sexual maturity at a younger age and frequently live at higher population densities than in their native range (Guichón et al. 2003; Bertolino et al. 2012). This may be related to a high hunting pressure in the native range,which selects for smaller adult size with respect to introduced areas (Purvis 2001); though it may also be explained by harsh climatic conditions in introduced ranges that favour heaviness animals. Coypus are found in a variety of aquatic habitats including: wetlands, ponds, lakes, rivers and streams. In these habitats, the species could affect vegetation and aquatic birds.

13. Does the organism occur outside effective containment in Europe?	Yes	
14. Is the organism widely distributed in Europe?	Yes	Established populations are present in Austria, Belgium, Bulgaria, Croatia, France, Germany, Greece, Italy, Luxembourg, Netherlands, Romania, Slovakia, Slovenia, Spain.
15. 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 Europe, in the open, in protected conditions or both?	Yes	The species is found in a variety of aquatic habitats such as wetlands, ponds, lakes, rivers and streams, even in urban areas; it is also present in some zoological gardens.
16. 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	
17. Is the other critical species identified in question 12 (or a similar species that may provide a similar function) present in Europe or likely to be introduced? If in doubt, then a separate assessment of the probability of introduction of this species may be needed.	NA	
18. Does the known geographical distribution of the organism include ecoclimatic zones comparable with those of Europe or sufficiently similar for the organism to survive and thrive?	Yes	The species is already established in many European countries; therefore climatic conditions in most of Europe are considered almost suitable for coypu. Anyway, coypu populations are sensitive to climatic conditions and severe winters may be the most limiting factor (Doncaster & Micol 1989). Severe winters have been credited extirpating coypu populations in several regions, including

		Scandinavian countries and in areas of the United States with more continental climates (Carter & Leonard 2002; Bertolimo 2009); therefore the northern part of Europe may be not suitable for the species.
19. Could the organism establish under protected conditions (e.g. glasshouses, aquaculture facilities, terraria, zoological gardens) in Europe?	Yes	The species is present in zoological gardens and private collections; but risks for accidental or voluntary releases are limited.
20. 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	Coypu has been introduced and established population in many localities of Europe, North America, Central and Eastern Asia including Japan and Korea, Kenya in East Africa, and the Middle East (Carter & Leonard 2002; Bertolino et al. 2012). Coypus were directly released into the wild to create populations, which may be exploited by trappers (e.g. in North America and Russia), or were maintained for breeding and reproduction in fur farms, from where they frequently escaped or were released (e.g. Europe).
21. Can the organism spread rapidly by natural means or by human assistance?	Yes	The species already spread over large areas in many European countries, as well as in North America and in part of Asia.
22. Could the organism as such, or acting as a vector, cause economic, environmental or social harm in Europe?	Yes	In many areas of introduction, the coypu is considered a pest because of its impact on ecosystems, crops and irrigation systems (Carter & Leonard 2002; Bertolino & Genovesi 2007). The impact of coypu on natural vegetation can be considerable, resulting in the contraction of many aquatic plants; severe restrictions are known on e.g. *Phragmites australis*, *Thypa* spp., *Potamogeton* spp., *Carex* spp., *Nymphaea alba*, *Nuphar lutea* (Wilner et al. 1979; Boorman & Fuller 1981; Bertolino et al. 2005; Prigioni et al. 2005). The overexploitation of reed beds can cause

		large openings in the vegetation (Willner et al. 1979; Boorman & Fuller 1981; Linscombe et al 1981). Coypus may affect waterbird breeding success, as they use bird nests as platform for resting, thus crushing or sinking the eggs during reproduction (Bertolino et al. 2011; Angelici et al. 2011). Coypus are known to eat crop plants, such as cereals, sugarcane, alfalfa, brassicas, ryegrass, saplings of fruit and nut trees, and root crops, especially sugar beet (Schitoskey et al. 1972; Abbas 1991; Gosling & Baker 2008; Panzacchi et al. 2007). The most important economic damage is caused by coypu's burrowing behaviour. Coypus dig extensive burrow systems into the riverbanks and ditches, disrupting drainage systems and posing a risk of flooding in low-lying areas. In Italy, the cost of riverbank repair following damage by coypus, was estimated at nearly 2 million Euros/year (Panzacchi et al. 2007). Extensive burrowing makes dikes and levees susceptible to collapse due to other factors, such as flooding or vehicular traffic (Bounds et al. 2003). The occurrence of *Toxoplasma gondii*, *Chlamydia psittaci*, *Leptospira* spp. was reported in Louisiana (Howerth et al. 1994), leptospirosis in France (Michel et al. 2001) and England (Watkins et al. 1985). Coypus are potentially sources of zoonotic infections and caution should be taken when handling individuals or when in contact with water that might have been contaminated by coypus.

SECTION B – Detailed assessment

PROBABILITY OF ENTRY

Important instructions:

- Entry is the introduction of an organism into Europe. Not to be confused with spread, the movement of an organism within Europe.
- For organisms which are already present in Europe, only complete the entry section for current active pathways of entry or if relevant potential future pathways. The entry section need not be completed for organisms which have entered in the past and have no current pathways of entry.

QUESTION	RESPONSE [chose one entry, delete all others]	CONFIDENCE [chose one entry, delete all others]	COMMENT
1.1. How many active pathways are relevant to the potential entry of this organism? (If there are no active pathways or potential future pathways respond N/A and move to the Establishment section)	none	high	The coypu is not traded and is not farmed anymore; therefore, there are no active pathways or potential future pathways. Natural spread from areas where the species is already established poses the most significant risk of expansion.
1.2. List relevant pathways through which the organism could enter. Where possible give detail about the specific origins and end points of the pathways. For each pathway answer questions 1.3 to 1.10 (copy and paste additional rows at the end of this section as necessary).	[insert text]		
Pathway name:	[inset pathway name here]		
1.3. Is entry along this pathway intentional (e.g. the organism is imported for trade) or accidental (the organism is a contaminant of imported goods)?	intentional accidental	low medium high very high	

(If intentional, only answer questions 1.4, 1.9, 1.10, 1.11)			
1.4. How likely is it that large numbers of the organism will travel along this pathway from the point(s) of origin over the course of one year? Subnote: In your comment discuss how likely the organism is to get onto the pathway in the first place.	very unlikely unlikely moderately likely likely very likely	low medium high very high	
1.5. How likely is the organism to survive during passage along the pathway (excluding management practices that would kill the organism)? Subnote: In your comment consider whether the organism could multiply along the pathway.	very unlikely unlikely moderately likely likely very likely	low medium high very high	
1.6. How likely is the organism to survive existing management practices during passage along the pathway?	very unlikely unlikely moderately likely likely very likely	low medium high very high	
1.7. How likely is the organism to enter Europe undetected?	very unlikely unlikely moderately likely likely very likely	low medium high very high	
1.8. How likely is the organism to arrive during the months of the year most appropriate for establishment?	very unlikely unlikely moderately likely likely very likely	low medium high very high	
1.9. How likely is the organism to be able to transfer from the pathway to a suitable habitat or host?	very unlikely unlikely moderately likely likely	low medium high very high	

	very likely		
1.10. Estimate the overall likelihood of entry into Europe based on this pathway?	very unlikely unlikely moderately likely likely very likely	low medium high very high	
End of pathway assessment, repeat as necessary.			
1.11. Estimate the overall likelihood of entry into GB based on all pathways (comment on the key issues that lead to this conclusion).	very unlikely unlikely moderately likely likely very likely	low medium high very high	

PROBABILITY OF ESTABLISHMENT

Important instructions:

- For organisms which are already well established in GB, only complete questions 1.15 and 1.21 then move onto the spread section. If uncertain, check with the Non-native Species Secretariat.

QUESTION	RESPONSE	CONFIDENCE	COMMENT
1.12. How likely is it that the organism will be able to establish in Europe based on the similarity between climatic conditions in Europe and the organism's current distribution?	very likely	very high	The species is already established in many European countries from Greece to Netherlands; therefore climatic conditions in most of Europe are considered suitable for coypus. Coypu populations are sensitive to climatic conditions and severe winters may be the most limiting factor (Doncaster & Micol 1989). Severe winters have been credited with extirpating coypu populations in several regions including Scandinavian countries and in areas of the United States with more continental climates (Carter & Leonard 2002; Bertolimo 2009); therefore the Northern part of Europe may be not suitable for the species.
1.13. How likely is it that the organism will be able to establish in Europe based on the similarity between other abiotic conditions in Europe and the organism's current distribution?	very likely	very high	The species is found in a variety of aquatic habitats such as wetlands, ponds, lakes, rivers and streams, even in urban areas. These habitats are common throughout Europe. Coypu populations are sensitive to climatic conditions and severe winters may be the most limiting factor (Doncaster & Micol 1989); therefore the northern part of Europe may be not suitable for the species
1.14. How likely is it that the organism will become established in protected conditions (in which the environment is artificially maintained, such as wildlife	likely	high	The species is already keeps in some wildlife parks and zoological gardens.

parks, glasshouses, aquaculture facilities, terraria, zoological gardens) in Europe? Subnote: gardens are not considered protected conditions			
1.15. How widespread are habitats or species necessary for the survival, development and multiplication of the organism in Europe?	widespread	very high	The species is found in a variety of aquatic habitats such as wetlands, ponds, lakes, rivers and streams, even in urban areas. Therefore no single species is "vital" for its survival, development and multiplication. Suitable habitats are present and widely distributed in the Risk Assessment Area.
1.16. 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 Europe?	NA		
1.17. How likely is it that establishment will occur despite competition from existing species in Europe?	very likely	high	The coypu does not suffer competition from other species. Competitive exclusion may occur with the muskrat *Ondatra zibethicus* (also introduced in Europe), but is detrimental to the last species (Bertolino et al. 2012).
1.18. How likely is it that establishment will occur despite predators, parasites or pathogens already present in Europe?	very likely	very high	Caimans in South America and alligators in North America are the most important predators of coypu (Woods et al. 1992). Other predators in the native and introduced ranges are felids and canids, other medium sized carnivores and some birds of prey (Woods et al. 1992; Bounds et al. 2003). This suite of predators, however, has not prevented the establishment, nor the spread of the species in Europe.
1.19. How likely is the organism to establish despite existing management practices in Europe?	likely	high	The coypu has been eradicated from England (Gosling & Baker 1989), and it is controlled by trapping and shooting to reduce damage in several countries (Carter & Leonard 2002; Bertolino & Genovesi 2007). In Italy, during a six-year period (1995-2000),

			despite the removal of 220,688 coypus the species continued to spread (Panzacchi et al. 2007). According to previous experiences, non-intense management operations may impact coypu populations with unexpected effects. The preferential capture of adult males in the first phases of control may create populations dominated by younger classes with a high potential for a subsequent population increase (Gosling & Baker 1989; Reggiani et al. 1993). Individuals escaping from disturbed areas may colonize new areas. Coypu populations were successfully managed also at a large scale, with significant results in terms of coypu population containment (Bertolino et al. 2005; Bertolino & Viterbi 2010) and eradication (Gosling & Baker 1989). An important feature of these projects was an adequate level of trapping effort, which was maintained constant or even increased after first results were achieved (Baker 2006; Bertolino & Viterbi 2010).
1.20. How likely are management practices in Europe to facilitate establishment?	NA		
1.21. How likely is it that biological properties of the organism would allow it to survive eradication campaigns in Europe?	likely	medium	The coypu has been eradicated in 2 small areas in the United States (Carter & Leonard 2002) and from a large area in England (Gosling & Baker 1989). The eradication campaign against the coypus in England is considered one of the most successful eradication projects carried out on mainland and should be used as a reference for future actions (Gosling & Baker 1989; Baker 2006). Key points of the successful campaign were a careful technical planning and a thoughtful evaluation of the human dimension.

			An important feature of successful control projects was an adequate level of trapping effort, which was maintained constant or even increased after first results were achieved (Baker 2006; Bertolino & Viterbi 2010. Non-intense management operations may fails to control or to eradicate the species. The preferential capture of adult males in the first phases of control may create populations dominated by younger classes, with a high potential for a subsequent population increase (Gosling & Baker 1989; Reggiani et al. 1993). Individuals escaping from disturbed areas may colonize new areas.
1.22. How likely are the biological characteristics of the organism to facilitate its establishment?	likely	high	Females are nonseasonal breeders, able to reproduce throughout the year starting when they are less than one year old; the mean litter size is 4-6 young (range 1-12, Weir 1974; Gosling 1981; Bounds et al. 2003; Guichón et al. 2003). Where environmental conditions are not limiting, females can have 2.7 litters/year after a 4 month gestation period with an average of 8-15 young/year (Brown 1975; Willner et al. 1979; Reggiani et al. 1993).
1.23. How likely is the capacity to spread of the organism to facilitate its establishment?	likely	high	The coypu is a semi-aquatic rodent which lives in wetlands, ponds, lakes, rivers and streams. Dispersal occurs mainly along rivers and canals; individuals rarely move more than 100 m away from the banks, whereas they can cover kilometres of a river (Kim 1980; Linscombe et al. 1981; Reggiani et al. 1993). The longest recorded distance travelled along a stream is 3.2. km (Lindscombe et al. 1981), though they have been reported to disperse 120 km downstream in a two-years period (Aliev 1968)
1.24. How likely is the adaptability of the organism to facilitate its establishment?	likely	high	The species could adapt to many aquatic habitats, such as ponds, lakes, rivers and streams; it is also

			found in river and lakes inside urban areas. Coypu populations are sensitive to climatic conditions and severe winters, especially in North Europe, may be the most limiting factor (Doncaster & Micol 1989).
1.25. How likely is it that the organism could establish despite low genetic diversity in the founder population?	likely	lmedium	There are no data on the effects of propagule pressure and genetic diversity on establishment success. However, the species established and spread in many countries and it is likely that populations would have increased also from few individuals. In many cases, wild populations originated from the releases of animals farmed for their fur. It can therefore be assumed that in several cases the animals were selected for a type of fur, and the genetic variability was reduced
1.26. Based on the history of invasion by this organism elsewhere in the world, how likely is to establish in Europe? (If possible, specify the instances in the comments box.)	very likely	very high	Coypu populations are now established in North America, Central and Eastern Asia including Japan and Korea, Kenya in East Africa, and the Middle East (Carter & Leonard 2002; Bertolino et al. 2012). In Europe established populations are present in Austria, Belgium, Bulgaria, Croatia, France, Germany, Greece, Italy, Luxembourg, Netherlands, Romania, Slovakia, Slovenia, Spain (DAISIE website); coypu was also established in England, where it has been eradicated (Gosling & Baker 1989). Therefore it is likely that the species could adapt to other European countries, especially in Central and Southern Europe.
1.27. If the organism does not establish, then how likely is it that transient populations will continue to occur? Subnote: Red-eared Terrapin, a species which cannot re-produce in Europe but is established because of continual release, is an example of a transient species.	unlikely	medium	The species has not adapted in northern Europe countries (e.g. Norway and Sweden). If in some areas the species does not establish, then it is probable that the introduced animals will disappear. However, since nowadays main pathway is natural dispersal, new tentative of colonization are likely in many areas.

1.28. Estimate the overall likelihood of establishment (mention any key issues in the comment box).	very likely	very high	Coypu populations are now established in North America, Central and Eastern Asia including Japan and Korea, Kenya in East Africa, and the Middle East (Carter & Leonard 2002; Bertolino et al. 2012). In Europe established populations are present in Austria, Belgium, Bulgaria, Croatia, France, Germany, Greece, Italy, Luxembourg, Netherlands, Romania, Slovakia, Slovenia, Spain (Bertolino 2009); it was also established in England where it has been eradicated (Gosling & Baker 1989). Therefore it is likely that the species could adapt to other European countries, especially in Central and Southern Europe.

PROBABILITY OF SPREAD

Important notes:

- Spread is defined as the expansion of the geographical distribution of a pest within an area.

QUESTION	RESPONSE	CONFIDENCE	COMMENT
2.1. How important is the expected spread of this organism in Europe by natural means? (Please list and comment on the mechanisms for natural spread.)	major	high	The species established and spread in many countries and this process will continue also in the future till the saturation of suitable areas.
2.2. How important is the expected spread of this organism in Europe by human assistance? (Please list and comment on the mechanisms for human-assisted spread.)	minor	high	Humans were responsible for coypu introductions when animals were released from fur farms or directly introduced in the wild to exploit populations. However, coypu fur market dropped and currently animals are no more farmed. Other human-mediated introduction are not known.
2.3. Within Europe, how difficult would it be to contain the organism?	difficult	high	The species has been eradicated from UK after an intense trapping project. Coypu populations were successfully contained with an adequate level of trapping effort (Bertolino et al. 2005; Bertolino & Viterbi 2010). However, population could quickly recover if control ends. In Italy, despite the removal of 220,688 coypu during years 1995-2000 the species continued to spread. Non-intense management operation, with preferential capture of adult males in the first phases of control, may create populations dominated by younger classes with a high potential for a subsequent population increase (Gosling & Baker 1989; Reggiani et al. 1993).
2.4. Based on the answers to questions on the potential for establishment and spread in Europe, define the area	[insert text]	low medium	Countries were the species is already established (Austria, Belgium, Bulgaria, Croatia, France,

endangered by the organism.		high very high	Germany, Greece, Italy, Luxembourg, Netherlands, Romania, Slovakia, Slovenia, Spain) and neighbour countries are areas endangered by the organism.
2.5. What proportion (%) of the area/habitat suitable for establishment (i.e. those parts of Europe were the species could establish), if any, has already been colonised by the organism?	10-33	medium	Considering the biogeographic areas suitable for the species (Atlantic, Continental, Mediterranean, Pannonian) and the present distribution (see map in DAISIE website that, however, is updated to year 2008 and therefore underestimate the present range of the species) about 25-30 of the area suitable for establishment has already been colonised by the coypu.
2.6. What proportion (%) of the area/habitat suitable for establishment, if any, do you expect to have been invaded by the organism five years from now (including any current presence)?	0-10	high	The species is spreading in many countries, but considering the extend of the area already occupied, in five year the increase in range would be limited.
2.7. What other timeframe (in years) would be appropriate to estimate any significant further spread of the organism in Europe? (Please comment on why this timeframe is chosen.)	20	medium	The species is spreading in many countries and in two decades it can be assumed that localized populations in Central and South of Europe could cover large areas.
2.8. In this timeframe what proportion (%) of the endangered area/habitat (including any currently occupied areas/habitats) is likely to have been invaded by this organism?	10-33	medium	The species is spreading in many countries and in two decades it can be assumed that localized populations in Central and South of Europe could cover large areas.
2.9. Estimate the overall potential for future spread for this organism in Europe (using the comment box to indicate any key issues).	moderately	medium	The species could spread along channels, rivers and other wetlands. Therefore, spread rate is influenced by the hydrography

PROBABILITY OF IMPACT

Important instructions:

- When assessing potential future impacts, climate change should not be taken into account. This is done in later questions at the end of the assessment.
- Where one type of impact may affect another (e.g. disease may also cause economic impact) the assessor should try to separate the effects (e.g. in this case note the economic impact of disease in the response and comments of the disease question, but do not include them in the economic section).
- Note questions 2.10-2.14 relate to economic impact and 2.15-2.21 to environmental impact. Each set of questions starts with the impact elsewhere in the world, then considers impacts in Europe separating known impacts to date (i.e. past and current impacts) from potential future impacts. Key words are in bold for emphasis.

QUESTION	RESPONSE	CONFIDENCE	COMMENTS
2.10. How great is the economic loss caused by the organism within its existing geographic range excluding Europe, including the cost of any current management?	massive	medium	In Italy, during a six-year period (1995-2000) with a management cost of € 2,614,408, the damage produced by the species amounted to € 11,631,721 (Panzacchi et al. 2007). Kettunen et al. (2009) considering the whole current European range extrapolated a cost of 65.69 million €/year. Economic loss are associated to damage to agriculture, river banks and control costs. The most important economic damage is caused by coypu's burrowing behaviour. Coypus dig extensive burrow systems into the riverbanks and ditches. In Italy, the cost of riverbank repair following damage by coypus, was estimated at nearly 2 million Euros/year (Panzacchi et al. 2007).
2.11. How great is the economic cost of the organism currently in Europe excluding management costs (include any past costs in your response)?	massive	medium	In Italy, during a six-year period (1995-2000) the damage produced by the species amounted to € 11,631,721 (Panzacchi et al. 2007). Kettunen et al. (2009) considering the whole current European range extrapolated a cost of 65.69 million €/year without a distinction between damage and management costs.

2.12. How great is the economic cost of the organism likely to be in the future in Europe excluding management costs?	massive	medium	Economic cost of coypu would likely increase with the spread of the species.
2.13. How great are the economic costs associated with managing this organism currently in Europe (include any past costs in your response)?	major	medium	In Italy, during a six-year period (1995-2000) management costs were € 2,614,408. Kettunen et al. (2009) considering the whole current European range extrapolated a cost of 65.69 million €/year without a distinction between damage and management costs.
2.14. How great are the economic costs associated with managing this organism likely to be in the future in Europe?	major	medium	Management costs would likely increase with the spread of the species
2.15. How important is environmental harm caused by the organism within its existing geographic range excluding Europe?	major	high	Coypus are generalist herbivores which can feed on a wide variety of plant materials, including leaves, stems and roots. As a result of this feeding activity, large areas of *Nuphar lutea*, *Rumex* spp., *Sagittaria* spp., *Scirpus* spp., *Phragmites australis*, *Trapa natans*, *Typha* spp., may be eliminated (Ellis 1963; Willner et al. 1979; Boorman & Fuller 1981; Bertolino et al. 2005). Coypus could exert impacts on waterbirds, by using their nests as platform for resting and, therefore, crushing or sinking the eggs (Bertolino et al. 2011; Angelici et al. 2012). In USA where the species has also been introduced, coypu has an important impact on the aboveground biomass of native marsh plant species, such as chairmaker's bulrush, *Scirpus americanus* (Johnson & Foote 1997) and arrowheads, *Sagittaria latifolia* and *S. platyphylla* (Llewellyn & Shaffer 1993). In Louisiana and Maryland coypu feeding activity has been associated with the loss of brackish and freshwater marshes through a process known as eatout (Foote & Johnson 1993; Carter et al. 1999).

2.16. How important is the impact of the organism on biodiversity (e.g. decline in native species, changes in native species communities, hybridisation) currently in Europe (include any past impact in your response)?	major	high	The species could locally reduce the aquatic vegetation for its feeding activity and impact some waterbird species, by crushing or sinking their eggs. However, the impact on single species over large areas is not clear.
2.17. How important is the impact of the organism on biodiversity likely to be in the future in Europe?	major	high	Present impact will increase in the future due to the spread of the species.
2.18. How important is alteration of ecosystem function (e.g. habitat change, nutrient cycling, trophic interactions), including losses to ecosystem services, caused by the organism currently in Europe (include any past impact in your response)?	major	high	The main impact is habitat destruction and changes in the composition of local plant communities. Its preferential feeding on rhizomes or reeds reduces vegetal biodiversity and plant cover, leading to changes in the flow speed of the river, erosion and flood (Barrat et al. 2010). In the Norfolk Broads (UK), selective feeding on *Phragmites australis* opened up the waterways and changed the vegetation composition (Boorman & Fuller 1981).
2.19. How important is alteration of ecosystem function (e.g. habitat change, nutrient cycling, trophic interactions), including losses to ecosystem services, caused by the organism likely to be in Europe in the future?	major	high	The spread of the species in many countries would increase the surface where coypu could affect ecosystem functions.
2.20. How important is decline in conservation status (e.g. sites of nature conservation value, WFD classification) caused by the organism currently in Europe?	major	medium	Changes in the composition of local plant communities, and in the flow speed of rivers (Boorman & Fuller 1981; Barrat et al. 2010) will likely decrease the conservation status of wetlands where coypus are present. For instance, studies showed an impact to EU 92/43 "Habitat" Directive Habitat: 3150 Natural eutrophic lakes, 3160 Natural dystrophic lakes and ponds (Bertolino et al. 2005); 1130 Estuaries, 1150 Coastal lagoons 1410 with reedbeds and other species (Boorman & Fuller 1981): Mediterranean salt meadows (Marini et al. 2011, 2013).
2.21. How important is decline in conservation status (e.g.	major	medium	The spread of the species in many countries would

sites of nature conservation value, WFD classification) caused by the organism likely to be in the future in Europe?			increase the surface where coypu could decrease the conservation status of habitats listed in the EU 92/43 "Habitat" Directive Habitat.
2.22. How important is it that genetic traits of the organism could be carried to other species, modifying their genetic nature and making their economic, environmental or social effects more serious?	minimal	high	
2.23. How important is social, human health or other harm (not directly included in economic and environmental categories) caused by the organism within its existing geographic range?	major	high	Coypus are implicated in leptospirosis (e.g. Waitkins et al. 1985; Michel et al. 2001; Bollo et al. 2003). Vein et al. (2013 online first) found a significant prevalence of kidney carriage (8.0 - 12.1%) and consider coypu as a real reservoir for leptospirosis. Human leptospirosis is considered an emerging risk for Europe (Dupouey 2014). Nardoni et al. (2011) found coypu heavily parasitized with *Toxoplasma*, suggesting that the species could be a reservoir of this parasite
2.24. How important is the impact of the organism as food, a host, a symbiont or a vector for other damaging organisms (e.g. diseases)?	major	high	Coypus are implicated in leptospirosis (e.g. Waitkins et al. 1985; Michel et al. 2001; Bollo et al. 2003). Vein et al. (2013 online first) found a significant prevalence of kidney carriage (8.0 - 12.1%) and consider coypu as a real reservoir for leptospirosis. Human leptospirosis is considered an emerging risk for Europe (Dupouey 2014). Nardoni et al. (2011) found coypu heavily parasitized with *Toxoplasma*, suggesting that the species could be a reservoir of this parasite
2.25. How important might other impacts not already covered by previous questions be resulting from introduction of the organism? (specify in the comment box)	major	high	Coypus dig extensive burrow systems into the riverbanks and ditches, disrupting drainage systems and posing a risk of flooding in low-lying areas. In Italy, the cost of riverbank repair following damage by coypus, was estimated at nearly 2 million Euros/year (Panzacchi et al. 2007). Extensive burrowing makes dikes and

			levees susceptible to collapse due to other factors, such as flooding or vehicular traffic (Bounds et al. 2003).
2.26. How important are the expected impacts of the organism despite any natural control by other organisms, such as predators, parasites or pathogens that may already be present in Europe?	major	high	Possible predators in Europe are felids and canids, other medium sized carnivores and some birds of prey (Bertolino et al. 2012); their predation is however limited and may not impact populations.
2.27. Indicate any parts of Europe where economic, environmental and social impacts are particularly likely to occur (provide as much detail as possible).	[insert text + attach map if possible]	high	Most of the countries where the species is already established: Austria, Belgium, Bulgaria, Croatia, France, Germany, Greece, Italy, Luxembourg, Netherlands, Romania, Slovakia, Slovenia, Spain (Map in DAISIE website).

RISK SUMMARIES

	RESPONSE	CONFIDENCE	COMMENT
Summarise Entry	very likely	very high	The coypu is not traded and is not farmed anymore; therefore there are no active pathways or potential future pathways. Natural spread from areas where the species is already established poses the most significant risk of expansion.
Summarise Establishment	very likely	very high	The species is already established in many European countries: Austria, Belgium, Bulgaria, Croatia, France, Germany, Greece, Italy, Luxembourg, Netherlands, Romania, Slovakia, Slovenia, Spain. Management actions aimed at limiting damage and/or populations are ongoing in some countries, but results are not always known and their effectiveness is sometime questionable.
Summarise Spread	moderately	medium	The species established and spread in many countries and this process will continue also in the future till the saturation of suitable areas. Climatic conditions in most of Europe are considered suitable for grey squirrels, except for the Northern countries (e.g. Scandinavia and Baltic countries).
Summarise Impact	massive	high	The main ecological impact is habitat destruction and changes in the composition of local plant communities. Coypus are generalist herbivores that can feed on a wide variety of plant materials, including leaves, stems and roots. As a result of this feeding activity, large areas of aquatic vegetation may be eliminated (Ellis, 1963; Willner et al. 1979; Boorman & Fuller 1981; Bertolino et al. 2005). Its preferential feeding on

			rhizomes or reeds reduces vegetal biodiversity and plant cover, leading to changes in the flow speed of the river, erosion and flood (Barrat et al. 2010). Coypus could impact waterbirds using their nests as platform for resting and, therefore, crushing or sinking their eggs (Bertolino et al. 2011; Angelici et al. 2012). Economic loss are associated to damage to agriculture, river banks and control costs. The most important economic damage is caused by coypu's burrowing behaviour. Coypus dig extensive burrow systems into the riverbanks and ditches, disrupting drainage systems. Extensive burrowing makes dikes and levees susceptible to collapse due to other factors, such as flooding or vehicular traffic (Bounds et al. 2003). Cost of coypu management (damage and species control) in Italy, amounted to € 11,631,721 in six years (Panzacchi et al. 2007). Kettunen et al. (2009) considering the whole current European range extrapolated a cost of 65.69 million €/year. Coypu are implicated in leptospirosis (e.g. Waitkins et al. 1985; Michel et al. 2001; Bollo et al. 2003). Vein et al. (2013 online first) found a significant prevalence of kidney carriage (8.0 - 12.1%) and consider coypu as a real reservoir for leptospirosis. Human leptospirosis is considered an emerging risk for Europe (Dupouey 2014).
Conclusion of the risk assessment	high	high	The species is already established in many countries and it is spreading in Europe. A large number of scientific publications demonstrate the invasiveness of the species in aquatic ecosystems and its economic impact due to damage to crops and river banks.

Additional questions are on the following page ...

ADDITIONAL QUESTIONS - CLIMATE CHANGE			
3.1. What aspects of climate change, if any, are most likely to affect the risk assessment for this organism?	[insert text]	high	Coypu populations are sensitive to climatic conditions and severe winters may be the most limiting factor (Goslin 1981; Doncaster & Micol 1989). Therefore, the present climate change may further benefit the species in colonising new areas.
3.2. What is the likely timeframe for such changes?	50 - 100 years	medium	
3.3. What aspects of the risk assessment are most likely to change as a result of climate change?	[Increase climatic suitability of Northern areas]	medium	
ADDITIONAL QUESTIONS - RESEARCH			
4.1. If there is any research that would significantly strengthen confidence in the risk assessment please summarise this here.	[The species invasiveness is demonstrated by many papers]	high	Confidence in the risk assessment is high. The species is established in many European countries and a large number of scientific publications demonstrate the invasiveness of coypu, its ecological and economic impact. The species is also established in other continents (e.g. North America and Asia) and scientific publications from North America demonstrate a similar impact, if not even higher. Further research should better quantify economic cost over large areas and effectiveness of control programs in term of population containment and ecological or economic damage reduction.

Please provide a reference list on the following page ...

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