

Risk Assessment of Egyptian goose *Alopochen aegyptiacus*

Name of Organism:	<i>Alopochen aegyptiacus</i> – Egyptian goose
Objective:	Assess the risks associated with this species in the European Union
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Name of organism: Egyptian goose *Alopochen aegyptiacus*

Question	Response
1. In how many EU member states has this species been recorded? List them.	11 EU member states: Great Britain, The Netherlands, Belgium, France, Germany, Austria, Spain, Sweden, Denmark, Italy, Poland (DAISIE 2008)
2. In how many EU member states has this species currently established populations? List them.	6 EU member states: Great Britain, The Netherlands, Belgium, Germany, Denmark, Poland (DAISIE 2008)
3. In how many EU member states has this species shown signs of invasiveness? List them.	10 EU member states: Great Britain, The Netherlands, Belgium, France, Germany, Austria, Spain, Denmark, Italy, Poland
4. In which EU Biogeographic areas could this species establish?	Continental area, Atlantic area, Boreal area, Mediterranean area
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.	28 EU member states: Ireland, Finland, Estonia, Latvia, Lithuania, Czech Republic, Slovakia, Romania, Hungary, Slovenia, Croatia, Bulgaria, Greece, Portugal, Malta, Luxembourg (plus all countries

	in which the species has been recorded)
6. In how many EU member states could this species become invasive in the future [given current climate] (where it is not already established)?	28 EU member states. Invasiveness is possible in every EU member state. The Egyptian goose is a generalist species. It has a large geographic distribution range and is largely sedentary. Based on evidence from the past, the species has a high colonization and dispersion potential.

Organism information

Organism information	Response	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?	<i>Alopochen aegyptiacus</i> Linnaeus, 1766	Yes, this species can be adequately distinguished from other entities
2. Does a relevant earlier risk assessment exist? (give details of any previous risk assessment)	Yes	Risk analysis of the Egyptian Goose was carried out in the Netherlands (Gyimesi & Lensink 2010). Completed risk assessment for Great Britain is to follow the comment period (Wright 2011).
3. Where is the organism native?		Africa – central and south: Angola; Botswana; Burkina Faso; Burundi; Cameroon; Central African Republic; Chad; Congo; The Democratic Republic of the Congo; Djibouti; Egypt; Equatorial Guinea; Eritrea; Ethiopia; Gabon; Gambia; Guinea; Guinea-Bissau; Kenya; Lesotho; Malawi; Mali; Mauritania; Mozambique; Namibia; Niger; Nigeria; Rwanda; Senegal; Somalia; South Africa; South Sudan; Sudan; Swaziland; Tanzania, United Republic of Tunisia; Uganda; Zambia; Zimbabwe (BirdLife International 2012).
4. What is the global		Apart from Europe, Egyptian goose was introduced to the United States, Israel, United Arab Emirates,

distribution of the organism (excluding Europe)?		Mauritius, New Zealand and Australia (Long 1981; Blair <i>et al.</i> 2000; Braun 2004; Banks <i>et al.</i> 2008; BirdLife International 2012).
5. What is the distribution of the organism in Europe?		Great Britain, The Netherlands, Belgium, France, Germany, Austria, Spain, Denmark, Italy, Poland (DAISIE 2008)
6. Is the organism known to be invasive (i.e. to threaten organisms, habitats or ecosystems) anywhere in the world?	Yes	<p>While invasiveness of Egyptian goose is often suspected, paucity of detailed studies of the impact of this species in its introduced range makes it difficult to confirm these claims. Increase in numbers of introduced species has been demonstrated to stimulate research (McKenzie & Robertson 2015). Hybridization of Egyptian geese occurs with other goose and duck species (Banks <i>et al.</i> 2008). Reported cases include mallard <i>Anas platyrhynchos</i>, ruddy shelduck <i>Tadorna ferruginea</i>, shelduck <i>T. tadorna</i>, barnacle goose <i>Branta leucopsis</i> and Canada goose <i>B. canadensis</i> (Lensink 1996; Harrop 1998; Lever 2005; McCarthy 2006). Hybrids are usually infertile (Homma & Geiter 2010).</p> <p>The species is aggressive towards other birds (Teixeira 1979; Lensink 1996; Pieterse & Tamis 2005), which may limit availability of foraging areas - particularly important during moulting (usually in summer), when many waterfowl species become flightless.</p> <p>In the Netherlands and Belgium, there is some evidence that Egyptian Geese may cause a reduction in the numbers of other waterbirds, through its aggressive behaviour towards them (Sneep 1999; Anselin & Devos 2007). The Egyptian goose may chase away goshawks <i>Accipiter gentilis</i> and buzzards from their nests, which forces them to delay the onset of their breeding at a risk of failure (van Dijk 2000). The species also takes over nesting sites of shelducks and mallards (Van den Bergh 1993; Lensink 1996). Egyptian geese may start breeding already in February thus taking over the most suitable nesting sites before other species start their breeding period.</p> <p>In South Africa breeding success of black a sparrowhawk <i>Accipiter melanoleucus</i> was lowered as a result of taking over the nests by Egyptian geese (Curtis <i>et al.</i> 2007). New research also show that black sparrowhawks avoid direct conflict with Egyptian goose – large and aggressive competitor and instead choose the passive strategy of allocating more resources to multiple nest building (Sumasgutner <i>et al.</i> 2016).</p> <p>Fierce territoriality causes that Egyptian geese may drown other species, including shelduck, Magellan</p>

		<p>goose <i>Chloephaga picta</i>, mallard, moorhen <i>Gallinula chloropus</i>, house sparrow <i>Passer domesticus</i>, starling <i>Sturnus vulgaris</i>, magpie <i>Pica pica</i> and blackbird <i>Turdus merula</i> (Eikhoudt 1973).</p> <p>In South Africa the species is recognized as an agricultural pest. The population there has increased by 163% over the past 20 years (Mackay et al. 2014). It is dependent on grasslands, which are commonly fertilized agricultural pastures (Beck <i>et al.</i> 2002, Mangnall & Crowe 2001 2002). Grazing of a large number of geese (e.g. aggregations during moulting, reaching occasionally more than 1.000 individuals) causes damage to grasslands. Trampling, fouling and aggressive behaviour is also a nuisance on golf courses and in parks in South Africa (Little & Sutton 2013; Mackay et al. 2014).</p> <p>Also in England and the Netherlands winter foraging areas may include grain fields (Sutherland & Allport 1991). Similarly, the Belgian population switches to winter grain, sugar beet and potato fields in winter and spring Beck et al. (2002). Additionally to actual consumption, damage may be caused also by trampling and polluting pastures by defecation.</p> <p>Although the species is not known to make long distance movements, it may be a potential vector of avian influenza. Moulting aggregations in summer and large flocks feeding in winter may increase the risk of easy spread of the disease, particularly that these concentrations may be in the vicinity of poultry farms (Gyimesi & Lensink 2010). In South Africa, an outbreak of H5N2 avian influenza at an ostrich farm was attributed to the presence of Egyptian goose (Thompson <i>et al.</i> 2008). In Israel it was demonstrated that the species carries the avian paramyxovirus, serotype 3 (Shihmanter <i>et al.</i> 1998).</p> <p>Large moulting flocks may intensify eutrophication by defecating in small water reservoirs, which may increase P/N ratio. Consequently, the risk of algal and bacterial blooms and infections may increase (Anselin & Devos 2007; Gyimesi & Lensink 2010).</p> <p>Large flocks of geese may be a nuisance due to defecating on public roads, and in recreational areas near water reservoirs. Although no records are available of Egyptian geese attacking humans, the species is known to be aggressive (Gyimesi & Lensink 2010).</p>
7. Could the organism establish under protected conditions (e.g.	Yes	The species is present in zoological gardens and private collections; risk for accidental or voluntary releases is high. According to Zoological Information Management System there are 357 individuals kept in 64 institutions (mainly zoos) across Europe in 2016 (ZIMS 2016). Respective estimates are not available for private collections, although it is likely that the numbers of birds they hold is higher.

<p>glasshouses, aquaculture facilities, terraria, zoological gardens) in Europe?</p>		
<p>8. 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? Can the organism spread rapidly by natural means or by human assistance?</p>		<p>The native range of the Egyptian goose is in Africa and it breeds in mainly sub-tropical regions south of the Sahara up to and including the Upper-Nile area in Egypt (Brown <i>et al.</i> 1982). Until early 18th century, its range extended to Algeria, Tunisia, Turkey, the western part of the Middle-East, and as far north as Hungary (Schenk 1918; Brehm 1927). Reasons for the range retraction are unknown (Cramp & Simmons 1978).</p> <p>All European populations of Egyptian geese originate from four main sources: birds escaped from parks in East Anglia (England), in The Hague and in Groningen (The Netherlands) and in Brussels (Belgium) (Gyimesi & Lensink 2010). Also in Poland breeding population was established by individuals that escaped from captivity (Alien Species in Poland 2016). Escapes at other locations (e.g. Germany) are not excluded.</p> <p>Expansion of the English population has been fairly slow since its establishment more than 300 years ago. In continental Europe, however, the spread was rapid and exponential shortly after the first breeding (Lensink 1999a; Gyimesi & Lensink 2010). In the Netherlands the average speed of expansion of the breeding range was estimated at 3 km per year until 1994 (Lensink 1998; 2002).</p>
<p>9. Whether there are any benefits from the presence of the species?</p>		<p>Egyptian geese is a game species in some countries, including Great Britain, Belgium and Germany (Gyimesi & Lensink 2010). Numbers on individuals shot in Germany are on a sharp increase. The mean hunting bag between 2006/2007 and 2010/2011 was 5744 geese, whereas in 2012/2013 as many as 1083 Egyptian geese were hunted (Deutscher Jagdverband 2013). In North Rhine-Westphalia over 1600 individuals were shot in 2006/2007 and nearly 7000 in 2013/2014 (NABU Nordrhein-Westfalen 2016). In 2012 about 2500 Egyptian geese were shot in Lower Saxony, while in 2013 there were already almost 3100 individuals killed. In Hessen, the respective numbers increased from 874 in 2009 to 1425 in 2011 (Die Welt 2014).</p> <p>The species is kept in zoological gardens and private collections, thereby providing some economic and/or social benefits. In areas where the species is still rare, it is perceived as an attraction both by birdwatchers and general public (Avifaunistic Commission 2013), which may generate financial benefits due to tourism, although they are minimal.</p>

Probability of entry

Question	Response	Confidence	Comment
1. How many active pathways are relevant to the potential entry of this organism?	few, but mainly animal keeping and trade	very high	The species is already present in the Risk Assessment area, with viable and spreading populations in 12 countries. The main pathway for new introductions are escapes from captivity. However, even if this is completely stopped, new areas may be colonised as a result of expansion of populations established in the past.
2. List relevant pathways through which the organism could enter. Where possible give detail about the specific origins and end points of the pathways.	animal keeping and trade, expansion of the existing population		The primary pathway for entry involves escape or deliberate release from captivity. Egyptian goose is commonly kept as an ornamental species in zoos and private collections. According to Zoological Information Management System there were 357 individuals kept in 64 institutions (mainly zoos) across Europe in 2016 (ZIMS 2016). Respective estimates are not available for private collections, although it is likely that the numbers of birds they hold is higher. Importance of this pathway will remain high as long as the species continues to be traded.
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	very high	The species is intentionally imported and traded in many European countries. The animals may then escape or be deliberately released.
4. How likely is the organism to be able to transfer from the pathway to a suitable habitat or host?	very likely	very high	In most countries breeding populations were founded by escapees, which proves that the transfer to a suitable habitat is very easy (Gyimesi & Lensink 2010, Alien Species in Poland 2016). The species often escapes or is released in urban parks, suburban gardens, parkland, etc. (or move there from the places where specimens were released or escaped) that provide suitable habitats with supplemental feeding from humans. From these areas the species may spread to more natural habitats.
5. Estimate the overall likelihood of entry into Europe based on this	very likely	very high	The species is already present in Great Britain, The Netherlands, Belgium, France, Germany, Austria, Spain,

pathway?			Sweden, Denmark, Italy, Poland and is traded in others.
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Probability of establishment

Question	Response	Confidence	Comment
1. 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 Great Britain, the Netherlands, Belgium, Germany, Denmark, Poland. Due to its generalist behaviour, herbivory, wide range of preferred nesting sites, it is a species that easily adapts to new environments. In addition, its robustly-built body, non-migratory behaviour, aggressive territorial defence, large clutch size, multiple broods, few predators and high chick survival all add to its high potential to establish fast growing populations. For these reasons most territories in European countries are considered suitable for Egyptian goose.
2. How widespread are habitats or species necessary for the survival, development and multiplication of the organism in Europe?	widespread	very high	Suitable habitats include areas with open water, short grass and suitable nesting sites. This type of environment is very widespread in most of Europe. The species also easily adapts to man-made environments, e.g urban parks. (Sutherland & Allport 1991). Egyptian goose forage mainly on grass in Europe, Northwest, but also South and Central, and hence found extensive foraging habitat in the highly fertilized pastures of the Netherlands (van Eerden <i>et al.</i> 1996). In addition, cold winters that cause higher mortality are less frequent. As a result, the population showed an exponential increase in recent decades.

Probability of spread

Question	Response	Confidence	Comment
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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	very high	The history of the presence of Egyptian goose in Europe leaves no doubt that once it is established, its spread by natural means is inevitable. The spread is mainly due to dispersal of immature individuals. The rate of spread is estimated between intermediate in Great Britain (Gibbons et al. 1993) to exponential in Germany (Gyimesi & Lensink 2010).
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.)	major	very high	Human assistance may amplify the potential of natural expansion of the species by translocations and subsequent escapes or deliberate releases. The presence of the species in Europe began from deliberate introductions to parks in East-England. Similar introductions occurred in the Netherlands in the surroundings of The Hague and Groningen and in the 1970's near Brussels in Belgium. Nowadays the main pathway of Egyptian goose introductions in Europe has been connected to private citizens and animal traders who keep birds in captivity, with consequent risk of escape or release them into public estates and parks (Gyimesi & Lensink 2010, Wright 2011).
3. Within Europe, how difficult would it be to contain the organism?	moderate	moderate	Containment of the species would require significant efforts in areas where large populations are established. Additionally, However, practical difficulties are likely to arise there because of potential public opposition to control/eradication. However, the species is absent or at early stages of invasion in large parts of the continent where suitable conditions exist. In these areas. In these areas containment of the species would be relatively easy, provided adequate commitment.
4. Estimate the overall potential for future spread for this organism in Europe (using the comment box to indicate any key issues).	major	very high	It is very likely that the species will further spread. It was expected that the 0°C isocline would form the approximate border of the possible expansion range, as severe winters may have a negative effect on such a tropical-subtropical species (Lensink 1998; Gyimesi & Lensink 2010). However, the recent expansion of the species and successful

			wintering in Poland indicates that it is also capable of spreading in cooler climates (Birdwatching.pl 2016).
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Probability of impact

Question	Response	Confidence	Comment
1. How great is the economic loss caused by the organism within its existing geographic range excluding Europe, including the cost of any current management?	moderate	medium	<p>After a 163% increase in the population numbers over the past 20 years, in South Africa the species is recognized as an agricultural pest (Mackay et al. 2014). The local population is dependent on grasslands, which are commonly fertilized agricultural pastures (Beck <i>et al.</i> 2002). Grazing of large number of geese, that particularly during moulting may exceed 1000 birds, may amplify the damage to grasslands.</p> <p>Apart from direct consumption, damage may be incurred by trampling and polluting by defecation. Concentrations of Egyptian geese near poultry farms increase the risk of disease, such as avian influenza. An outbreak of H5N2 virus in an ostrich farm was attributed to contact with Egyptian geese (Thompson <i>et al.</i> 2008). In Israel, the species was demonstrated to carry the avian paramyxovirus, serotype 3 (Shihmanter <i>et al.</i> 1998). Moulting flocks may locally intensify eutrophication by defecating in small water bodies, which shifts the nutrient balance towards a high P/N ratio. This ratio at values above 6 can lead to a higher chance on the development of <i>blue algae</i> and bacterial loads.</p> <p>Trampling, fouling and aggressive behaviour is also a nuisance on golf courses and in parks in South Africa (Little & Sutton 2013; Mackay et al. 2014).</p>
2. How great is the economic cost of the organism currently in Europe excluding management costs (include any past costs in your response)?	moderate	medium	<p>In Europe the most evident damage caused by this species is grazing. In recent years in the Netherlands the damage recorded for Egyptian goose is increasing. Moreover, Egyptian geese in England were also observed to switch to forage on grain fields in the winter (Sutherland & Allport 1991). This was also recorded in Belgium on winter grain,</p>

			<p>sugar beet and potato fields in winter and spring , which behaviour is also described by Beck et al. (2002). In the Netherlands feeding on winter wheat is known from several areas in the western half of the country (Gyimesi & Lensink 2010).</p> <p>Although the species is not known to make long distance movements, it may be a potential vector of avian influenza. Moulting aggregations in summer and large flocks feeding in winter may increase the risk of easy spread of the disease, particularly that these concentrations may be in the vicinity of poultry farms (Gyimesi & Lensink 2010).</p>
3. How great is the economic cost of the organism likely to be in the future in Europe excluding management costs?	moderate	Medium	There is little doubt that the species will spread if no management is undertaken. Although the economic costs at the scale of the whole continent may remain moderate, in areas where the species reaches highest numbers they could be major.
4. How great are the economic costs associated with managing this organism currently in Europe (include any past costs in your response)?	minor	medium	Precise estimates of the management costs are not available. Considering that no large-scale control has been undertaken in Europe, these costs are likely to be minor.
5. How great are the economic costs associated with managing this organism likely to be in the future in Europe?	moderate	medium	The cost will be increasing with the increasing populations, although at the scale of the continent they can be estimated as moderate. The highest cost would be required in areas where the species is most abundant, whereas the costs of prevention and rapid response at early stages of introductions would be lower.
6. How important is environmental harm caused by the organism within its existing geographic range excluding Europe? How important is the	moderate	medium	<p>While invasiveness of Egyptian goose is often suspected, paucity of detailed studies of the impact of this species in its introduced range does not allow to confirm these claims.</p> <p>Ecological impact</p>

<p>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)?</p>			<p>Hybridization of Egyptian geese occurs with other goose and duck species (Banks <i>et al.</i> 2008). Reported cases include mallard <i>Anas platyrhynchos</i>, ruddy shelduck <i>Tadorna ferruginea</i>, shelduck <i>T. tadorna</i>, barnacle goose <i>Branta leucopsis</i> and Canada goose <i>B. canadensis</i> (Lensink 1996; Harrop 1998; Lever 2005; McCarthy 2006). Hybrids are usually infertile (Homma & Geiter 2010).</p> <p>The species is aggressive towards other birds (Teixeira 1979; Lensink 1996; Pieterse & Tamis 2005), which may limit availability of foraging areas - particularly important during moulting (usually in summer), when many waterfowl species become flightless.</p> <p>In the Netherlands and Belgium, there is some evidence that Egyptian Geese may cause a reduction in the numbers of other waterbirds, through its aggressive behaviour towards them (Sneep 1999; Anselin & Devos 2007, van der Have et al. 2015).</p> <p>The Egyptian goose may chase away goshawks <i>Accipiter gentilis</i> and buzzards from their nests, which forces them to delay the onset of their breeding at a risk of failure (van Dijk 2000). The species also takes over nesting sites of shelducks and mallards (Van den Bergh 1993; Lensink 1996). Egyptian geese may start breeding already in February thus taking over the most suitable nesting sites before other species start their breeding period.</p> <p>In South Africa breeding success of black a sparrowhawk <i>Accipiter melanoleucus</i> was lowered as a result of taking over the nests by Egyptian geese (Curtis <i>et al.</i> 2007). New research also show that black sparrowhawks avoid direct conflict with Egyptian goose – large and aggressive</p>
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			<p>competitor and instead choose the passive strategy of allocating more resources to multiple nest building (Sumasgutner <i>et al.</i> 2016).</p> <p>Fierce territoriality causes that Egyptian geese may drown other species, including shelduck, Magellan goose <i>Chloephaga picta</i>, mallard, moorhen <i>Gallinula chloropus</i>, house sparrow <i>Passer domesticus</i>, starling <i>Sturnus vulgaris</i>, magpie <i>Pica pica</i> and blackbird <i>Turdus merula</i> (Eikhoudt 1973).</p>
7. How important is the impact of the organism on biodiversity likely to be in the future in Europe?	moderate	low	Lack of detailed studies into the current levels of threat from the Egyptian goose make it difficult to make solid projections for the future. If uncontrolled, the spread of populations established in the past as well as new escapes and releases could increase the geographic scope of the current impact upon the European biodiversity.
8. 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)?	moderate	low	Moulting aggregations may locally intensify eutrophication processes by defecating in small waters bodies. This may shift the nutrient balance towards a high P/N ratio. This ratio at values above 6 can lead to a higher chance on the development of <i>blue algae</i> and bacterial loads (Anselin & Devos 2007; Gyimesi & Lensink 2010).
9. 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?	moderate	low	As is the case with forecasting future impact on biodiversity, it is difficult to reliably predict future ecosystem function because of paucity of data on the current situation. Further uncontrolled spread of the already established populations, enhanced by new escapes and releases, are likely to extend the area in which the impact will be incurred.
10. How important is it that genetic traits of the organism could be carried to other species, modifying their genetic nature and	moderate	medium	Egyptian geese hybridise with other geese and ducks (Banks <i>et al.</i> 2008), including mallard <i>Anas platyrhynchos</i> , ruddy shelduck <i>Tadorna ferruginea</i> , shelduck <i>T. tadorna</i> , barnacle goose <i>Branta leucopsis</i> and Canada goose <i>B.</i>

making their economic, environmental or social effects more serious?			<i>canadensis</i> (Lensink 1996; Harrop 1998; Lever 2005; McCarthy 2006). Hybrids are usually infertile (Homma & Geiter 2010). The species that hybridise with the Egyptian goose are not threatened but with increasing population of Egyptian goose hybridisation may locally lead to significant genetic pollution.
11. 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?	moderate	low	Large flocks of Egyptian geese may be a nuisance due to defecating on public roads, and in recreational areas near water reservoirs. Although no records are available of Egyptian geese attacking humans, the species is known to be aggressive (Gyimesi & Lensink 2010). The species can cause an aircraft bird strike risk within their native range (Wright 2011).
12. How important is the impact of the organism as food, a host, a symbiont or a vector for other damaging organisms (e.g. diseases)?	moderate	moderate	The species may be a vector of avian influenza. Moulting aggregations in summer and large flocks feeding in winter may increase the risk of easy spread of the disease, particularly that these concentrations may be in the vicinity of poultry farms (Gyimesi & Lensink 2010). In South Africa, an outbreak of H5N2 avian influenza at an ostrich farm was attributed to the presence of Egyptian goose (Thompson et al. 2008). In Israel it was demonstrated that the species carries the avian paramyxovirus, serotype 3 (Shihmanter et al. 1998). The species is not a long distance migrant, therefore it should not play a crucial role as a large-scale vector of diseases. However, it was proved that populations of neighbouring countries do exchange, thus a limited spread of diseases may easily occur (Gyimesi & Lensink 2010).
13. How important might other impacts not already covered by previous questions be resulting from introduction of the organism? (specify in the comment box)	minimal	high	Not known

14. 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?	moderate	moderate	Adult geese have few natural enemies. Eggs and goslings may be predated by mammals, birds, or predatory fish (Sutherland & Allport 1991). However, the history of the species presence in Europe indicates that natural enemies do not prevent it from establishment and spread.
15. Indicate any parts of Europe where economic, environmental and social impacts are particularly likely to occur (provide as much detail as possible).	western Europe	high	Oldest and largest European populations occur in the western part of the continent, therefore the likelihood of impact is highest there.

RISK SUMMARIES

	Response	Confidence	Comment
Summarise entry	very likely	high	The species is already present in the Risk Assessment area in Great Britain, The Netherlands, Belgium, France, Germany, Austria, Spain, Sweden, Denmark, Italy, Poland, with viable populations. The primary pathway for entry involves their escape or deliberate release from captivity. The origin of the pathway is considered to be the keeping of the animals in captivity but also deliberate introductions in parks. New areas are also colonised by individuals dispersing from the established populations. The species is still intentionally imported and traded in many European countries and is already kept as an ornamental bird in zoos, parks, gardens, private collections and animal farms.
Summarise establishment	very likely	high	The species already established in Great Britain, The Netherlands, Belgium, Germany, Denmark, Poland. Due to its generalist, mainly herbivorous feeding behaviour,

			<p>wide range of nesting sites, it is a species that easily finds its needs in new environments. In addition, its robustly built body, non-migratory behaviour, aggressive territorial defence, large clutch size, multiple broods, few predators and high chick survival all add to its high potential to establish new fast growing populations. For these reasons most territories in European countries are considered suitable for Egyptian goose.</p>
Summarise spread	very likely	high	<p>In case of new introduction in other countries, the likelihood of establishment is high and the spread could be fast. It is likely that the species will further spread, at least southwards. According to earlier assessments it was expected that the 0°C isocline would form the approximate border of the possible expansion range, as severe winters may have a negative effect on this tropical-subtropical species. However, the recent expansion of the species and successful wintering in Poland indicates that it is also capable of spreading in cooler climates (Birdwatching.pl).</p>
Summarise impact	moderate	medium	<p>The magnitude of present and future impacts will depend on the results of management activities and the possible establishment of new populations.</p> <p>The most evident damage caused by Egyptian goose is negative influence on the native species. The negative ecological impact on native goose and duck species occur in the form of hybridization, competition for food, competition for nesting sites, introduction and spread of diseases.</p> <p>Furthermore, the species may have impact on agriculture. Grazing of a large number of geese causes damage to grasslands. Additionally to direct consumption, damage may be caused also by trampling and polluting pastures by defecation. High concentrations of Egyptian geese nearby poultry farms may raise concerns for the occurrence of avian influenza or other pathogenic diseases. Finally, moulting aggregations may locally intensify eutrophication processes by defecating in smaller standing waters.</p>

Conclusion of the risk assessment	high	medium	It is beyond doubt that the species is capable of establishment and spread in large parts of the EU territory. While invasiveness of Egyptian goose is often suspected, paucity of detailed studies of the impact of this species in its introduced range makes it difficult to confirm these claims. However, the existing evidence indicates that the presence of the species does have some impact upon agriculture, water quality and native species. It is likely that with no management, the level of these impacts will increase with the increasing range and numbers of Egyptian goose population.
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Additional questions – climate change

Question	Response	Confidence	Comment
1. What aspects of climate change, if any, are most likely to affect the risk assessment for this organism?	likely	high	Egyptian goose is rapidly spreading in Europe nowadays, also in the countries with colder summers and winters than in its native region, e.g. Poland, where the species is also capable of overwintering. If the climate is warming up, probably it will have a positive impact on this species and may further benefit the species in colonising new areas where the current climatic conditions are too harsh .
2. What aspects of the risk assessment are most likely to change as a result of climate change?	moderate	medium	Probability of establishment and spread are most likely to modify as a result of climate change – if we consider global warming.

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