

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>Threskiornis aethiopicus</i> - Sacred Ibis | |
|----------------------------|---|--|---|
| Objectives: | | To assess the risks associated with this species in GB | |
| Version: | | FINAL 04/04/11 | |
| Author: | | L. Wright (BTO) | |
| Suggested citation: | | Wright, L. (2011). GB Non-native Organism Risk Assessment for <i>Threskiornis aethiopicus</i> . www.nonnativespecies.org | |
| N | QUESTION | RESPONSE | COMMENT |
| 1 | What is the reason for performing the Risk Assessment? | | Request by GB Programme Board |
| 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? | | |
| A | 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? | YES (Give the full name & Go to 7) | <i>Threskiornis aethiopicus</i> - Sacred Ibis. Similar species include <i>T. bernieri</i> (Madagascar Sacred Ibis), which was formerly considered to be a subspecies of <i>T. aethiopicus</i> but has recently been separated (Sibley & Monroe 1990, 1993, BirdLife International 2006). Other similar species include <i>T. molucca</i> (Australian White Ibis) and <i>T. melanocephalus</i> (Black-headed Ibis), whose identification, and separation from <i>T. aethiopicus</i> is described by Yésou & Clergeau (2005). |
| 6 | If not a single taxonomic entity, can it be redefined? | | |
| 7 | Is the organism in its present range known to be invasive, i.e. to threaten species, habitats or ecosystems? | YES (Go to 9) | Sacred Ibises are omnivorous, but largely predatory, feeding on amphibians, crustaceans, small rodents, molluscs, fish, earthworms, insects and the eggs and chicks of other bird species (Cramp and Simmons 1977, Kopij <i>et al.</i> 1996, Clergeau & Yésou 2006) and may therefore threaten native fauna of these types. In South Africa, where they are native, Sacred Ibis predation of eggs and chicks has been shown to be one of the most serious causes of mortality in seabird colonies (Williams & Ward 2006). Furthermore, in France, where there is an established population of introduced Sacred Ibises, they have been recorded to predate the eggs or chicks of a wide range of bird species including terns, egrets, ducks, seabirds and waders (Clergeau & Yésou 2006). In one incident, two Sacred Ibises were recorded to take all the eggs from a 30-nest Sandwich Tern <i>Sterna sandvicensis</i> colony in a few hours, causing the terns to desert the colony for the rest of the season, and similar incidents have been recorded with other tern species (Yésou & Clergeau 2005). They may outcompete native Cattle Egrets <i>Bubulcus ibis</i> and Little Egrets <i>Egretta garzetta</i> for nest sites (Yésou & Clergeau 2005). |
| 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? | YES (Go to 10) | There are occasional sightings of Sacred Ibis in the UK, largely in southern and eastern England. These records are probably a mixture of escapes from zoos or private collections in the UK, and vagrants from the naturalized populations in western France and the Netherlands, however vagrancy from the naturalized populations in continental Europe has not been proven (Dudley 2005). Since 2000 there have been several individuals recorded, but no groups of birds have been seen in the UK. Individuals of unknown origin were recorded in Norfolk in May, July and September-November 2001, Cheshire and later Staffordshire in June 2002, Yorkshire in August 2002, Norfolk during September and October 2004 and Berkshire in January 2006. There have been two records in Guernsey which are presumed, but not proven, to relate to vagrancy from the population on the French coast. A single individual was recorded on Guernsey from December 2004 to January 2005 and another in August 2007. Individual escapes have been recorded in Kent in January 2002 (probably an escape from London Zoo, where a bird had recently escaped) and in Lincolnshire in March 2002 an escaped bird was recorded in the wild but was subsequently recaptured. Finally, a single bird with a red colour ring (presumed escape) was present on the north-Norfolk coast from August 2007 until May 2008. There does not appear to be an increasing trend in the number of records, although it is difficult to assess trends from such a small number of records. No containment measures appear to have been recently used. |
| 10 | Is the organism widely distributed in the Risk Assessment area? | NO (Go to 11) | No wild populations of Sacred Ibises are known to be established within Great Britain. The ISIS database suggests that at least 224 captive Sacred Ibises are present in the UK, distributed among 21 zoos (https://app.isis.org/abstracts/abs.asp). Figures from the CITES database indicate that live Sacred Ibises have been imported to Great Britain from Tanzania in 1987 (10 individuals), 1989 (4 individuals) and 1990 (20 individuals); all were imported for "trade" purposes. Transfer of captive-bred Sacred Ibises between zoos within Great Britain has occurred in 1989 (2 individuals) and 1994 (6 individuals). |

| | | | |
|----|--|--|--|
| 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) | Found in a wide variety of habitats in both its native and introduced range, including meadows, rubbish dumps, marshes, reedbeds, seashore and ploughed fields (Clergeau & Yésou 2006). All of these habitats are widely available in the Great Britain. Generalist opportunistic feeder, with a large diet spectrum (Clergeau & Yésou 2006). Breeding colonies occur near large waterbodies, most often in trees, but also in low scrub or on the ground, particularly on islands. In its introduced range, all the breeding colonies in France have formed near the coast, suggesting that coastal sites may be more likely areas for colonisation in the UK, but in Italy the species breeds at an inland site. In its native range this species often breeds at inland sites near water. Because of its colonial breeding habits, should Sacred Ibis breed in the UK the initial breeding sites are likely to be in existing heron or egret colonies, as has occurred in Florida (Herring & Gawlik 2007), but if larger numbers of vagrants or escapes occurred in the UK then single species colonies could form. |
| 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) | Non-native breeding populations are established in France, Italy, the Netherlands and the USA (Banks <i>et al.</i> 2008, Clergeau & Yésou 2006, Herring & Gawlik 2007, Ottens 2006, Yésou & Clergeau 2005), which have similar ecoclimatic conditions. Occasional escaped (or vagrant) individuals are seen in the UK and appear to be able to survive well - one escaped bird has been sighted regularly on the north Norfolk coast from summer 2007 to spring 2008. |
| 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) | Non-native breeding populations are established in France, Italy, the Canary Islands of Spain, the Netherlands, the United Arab Emirates and the USA (Banks <i>et al.</i> 2008, Clergeau & Yésou 2006, Herring & Gawlik 2007, Ottens 2006, Yésou & Clergeau 2005). Escaped birds have also attempted to breed in Belgium, and a breeding colony was formerly established in a park in Barcelona (Spain) but was eradicated in 2001 (Banks <i>et al.</i> 2008, Yésou & Clergeau 2005). Most of these populations result from escapes from captivity, although many relate to escapes of free-flying 'captive' birds. Certainly populations in the Canary Islands, western and southern France, Belgium, the United Arab Emirates relate to escapes of free-flying birds; it is unclear whether the populations in Spain and Italy derived from free-flying captive birds or other accidental escapes. The population in Florida in the USA is thought to be derived from the accidental escape of birds from Miami Zoo following hurricane damage to their enclosures. The small population in the Netherlands is thought to originate from the established population in western France. |
| 17 | Can the organism spread rapidly by natural means or by human assistance? | YES (Go to 18) | The populations in western and southern France spread rapidly from their initial captive sources, and have established breeding colonies up to 350km away. The initial wild breeding occurred in western France on the Atlantic Coast at Golfe du Morbihan in 1993 (25 km from the zoo at Branfere that they had escaped from) and Lac de Grand Lieu (70 km from Branfere zoo). These introduced populations have increased exponentially since breeding in the wild first occurred and there are now around 3000 individuals breeding up to 350 km away from Branfere in western France (Clergeau & Yésou 2006). The average rate of population increase in western France is around 20% per year. In southern France birds escaped from Sigean, and birds have spread into the neighbouring region near the Mediterranean coast. There are now thought to be at least 250 birds breeding up to 150 km from the zoo at Sigean. The population in the Netherlands is thought to result from spread from the introduced population in western France. |
| 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) | Birds from the established population of introduced Sacred Ibises in France have been recorded to predate the eggs or chicks of a wide range of bird species including terns, egrets, ducks, seabirds and waders (Clergeau & Yésou 2006). In one incident, two Sacred Ibises were recorded to take all the eggs from a 30-nest Sandwich Tern <i>Sterna sandvicensis</i> colony in a few hours, causing the terns to desert the colony for the rest of the season, and similar incidents have been recorded with other tern species (Yésou & Clergeau 2005). They may outcompete native Cattle Egrets <i>Bubulcus ibis</i> and Little Egrets <i>Egretta garzetta</i> for nest sites (Yésou & Clergeau 2005). They also occur frequently in areas close to human habitation, where they may feed from rubbish bins, which has caused some environmental health concerns in parts of France (Clergeau & Yésou 2006, Yésou & Clergeau 2005). |
| 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 | |
| 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? | moderate number - 2 | LOW - 0 | Escapes from zoos or other collections holding captive birds, and natural spread (flight) from established introduced populations in continental Europe. |
| 1.2 Choose one pathway from the list of pathways selected in 1.1 to begin the pathway assessments. | Spread from established introduced populations in continental Europe | | Spread from established populations in continental Europe is the most likely pathway, but escape from captivity within the UK could also occur, and could potentially lead to the establishment of wild populations as has occurred in France (Clergeau & Yésou 2006). |
| 1.3 How likely is the organism to be associated with the pathway at origin? | very likely - 4 | LOW - 0 | The origin of the pathway is established colonies of introduced Sacred Ibises already present at various sites in the near continent. |
| 1.4 Is the concentration of the organism on the pathway at origin likely to be high? | moderately likely - 2 | MEDIUM -1 | Large concentrations of introduced Sacred Ibises occur at breeding colonies in a few locations in France (on the west coast there are several colonies with a total of at least 1,100 pairs and at least 3,000 individuals, while on the southern Mediterranean coast there are over 100 pairs and at least 250 individuals) and, to a lesser extent, the Netherlands, where breeding has occurred at Botshol, Noord-Holland, and nearby Vinkeveen, Utrecht, with a total of 7 nests found when the last census was carried out in 2005 (Clergeau & Yésou 2006, Ottens 2006, Yésou & Clergeau 2005). |
| 1.5 How likely is the organism to survive existing cultivation or commercial practices? | very likely - 4 | LOW - 0 | Sacred Ibises are very adaptable and will feed in a variety of man-made habitats including rubbish tips, farmyards, ploughed fields and even slurry pits (Clergeau & Yésou 2006). |
| 1.6 How likely is the organism to survive or remain undetected by existing measures? | likely - 3 | LOW - 0 | Large, easily recognisable and tends to be found in open habitats where it is likely to be seen, often close to human habitation. However no clear and fool-proof method exists for transferring records from the public to policy makers. Any breeding records should, in theory, be reported to the Rare Breeding Birds Panel, but some birdwatchers may ignore non-native species, and it is widely recognised that many non-native species are under-recorded. |
| 1.7 How likely is the organism to survive during transport /storage? | N/A | LOW - 0 | |
| 1.8 How likely is the organism to multiply/increase in prevalence during transport /storage? | N/A | LOW - 0 | |
| 1.9 What is the volume of movement along the pathway? | minor - 1 | HIGH -2 | There are only occasional records of Sacred Ibises in Great Britain (around 14 different birds since 2000), and it is uncertain how many (if any) of these are vagrants from the naturalized populations in France & the Netherlands (Dudley 2005). However, Sacred Ibises have been recorded to move several hundred kilometres from colonies in France (Yésou & Clergeau 2005). |
| 1.10 How frequent is movement along the pathway? | rarely - 1 | HIGH -2 | See above. |
| 1.11 How widely could the organism be distributed throughout the Risk Assessment area? | very widely - 4 | HIGH -2 | Populations of introduced Sacred Ibises have spread over a fairly wide area in a relatively short time in France (Clergeau & Yésou 2006) (e.g. 3000 birds have established up to 350 km from the source in around 15 years in western France). Also, because of their ability to adapt to, and thrive in, a wide range of habitat types found in Britain, it is likely that these birds could survive in a wide range of locations in this country. |
| 1.12 How likely is the organism to arrive during the months of the year most appropriate for establishment ? | moderately likely - 2 | LOW - 0 | Vagrants from naturalized populations in Europe could occur at any time of the year. Not certain whether any particular time of the year is more appropriate for establishment than others, as birds survive throughout the year in France (Clergeau & Yésou 2006, Yésou & Clergeau 2005). Occurrences in Great Britain have occurred at all times of the year, but it is uncertain how many of these relate to escapes and how many (if any) were vagrants from the established population in western France, although it seems likely that the birds that occurred in Guernsey in December 2004 - January 2005 and in August 2007 would have been vagrants from the French population. |
| 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 | LOW - 0 | |
| 1.14 How likely is the organism to be able to transfer from the pathway to a suitable habitat? | very likely - 4 | LOW - 0 | Sacred Ibises are able to adapt to a wide range of habitats, including many that are widespread in Great Britain (Clergeau & Yésou 2006). |

| | 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? | very similar - 4 | LOW - 0 | Climatic conditions in Great Britain are similar to those found in western France and the Netherlands, where introduced Sacred Ibises have formed established breeding populations and spread successfully. |
| 1.16 | How similar are other abiotic factors that would affect establishment in the Risk Assessment area and in the area of present distribution? | very similar - 4 | LOW - 0 | See above. |
| 1.17 | How many species (for herbivores, predators and parasites) or suitable habitats vital for the survival, development and multiplication of the organism are present in the Risk Assessment area? Specify the species or habitats and indicate the number. | very many - 4 | LOW - 0 | Sacred Ibises are opportunistically feeding omnivorous, but largely predatory birds. Diet includes earthworms, insects, molluscs, crustaceans, fish, small rodents, amphibians, eggs and chicks of other bird species, as well as refuse scavenged from rubbish dumps or bins. All of these are widely available in Great Britain. They may also adapt to nest in a variety of habitats including in trees, in low scrub or on the ground, especially on islands (Cramp & Simmons 1977, Clergeau & Yésou 2006). |
| 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? | widespread - 4 | LOW - 0 | See above. |
| 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 assessment area? | N/A | LOW - 0 | Sacred Ibises do not require another species for establishment, however in parts of France and in Florida (USA) introduced Sacred Ibises have formed mixed breeding colonies with herons or egrets, although they may also form single-species colonies (Clergeau & Yésou 2006, Herring & Gawlik 2007). These species are present in Great Britain in habitats suitable for colonisation by Sacred Ibises. |
| 1.20 | How likely is it that establishment will not be prevented by competition from existing species in the Risk Assessment area? | very likely - 4 | LOW - 0 | Establishment has not been prevented in France, which has a similar suite of species to the UK. Indeed in some places in France, introduced Sacred Ibises outcompeted native Little Egrets and Cattle Egrets for nest sites (Kayser <i>et al.</i> 2005, Yésou & Clergeau 2005). |
| 1.21 | How likely is it that establishment will not be prevented by natural enemies already present in the Risk Assessment area? | very likely - 4 | LOW - 0 | There are few (if any) natural predators in Great Britain that are likely to take adult sacred ibises. Eggs or chicks may be predated by mammals or birds, but this is unlikely to prevent establishment. |
| 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 | Sacred Ibises are already established in France and the Netherlands, where man's management of the environment is broadly similar to Great Britain. |
| 1.23 | How likely is it that existing control or husbandry measures will fail to prevent establishment of the organism? | very likely - 4 | LOW - 0 | No co-ordinated control exists. |
| 1.24 | How often has the organism been recorded in protected conditions, e.g. glasshouses, elsewhere? | occasional - 2 | HIGH -2 | No reports found. The extent to which Sacred Ibises are kept in zoos is not known, and we received no response when we contacted the IUCN Storks, Ibises and Spoonbills specialist group to ask what numbers of Sacred Ibises were kept in zoos in the UK. |
| 1.25 | How likely is the reproductive strategy of the organism and duration of its life cycle to aid establishment? | likely - 3 | MEDIUM -1 | Sacred Ibises lay 2-4 eggs per brood, but not all young survive with 1-2 fledglings per pair on average (Cramp & Simmons 1977). They are long lived. In France the population has increased exponentially since a small number of birds escaped from a zoological park in the 1970s and 1980s, with the population now in excess of 3,000 individuals (Yésou & Clergeau 2005). Between 1993 and 2005 the population increased by an average of 20% per year. |
| 1.26 | How likely is it that the organism's capacity to spread will aid establishment? | likely - 3 | MEDIUM -1 | In France birds have spread to form breeding colonies up to 350 km from the site where they were originally introduced, and birds have been observed several hundred kilometres from breeding colonies (Clergeau & Yésou 2006, Yésou & Clergeau 2005). The Channel provides a potential barrier which could make spread to the UK from France less likely than spread to other parts of continental Europe, but it will not prevent it from occurring. |
| 1.27 | How adaptable is the organism? | very adaptable - 4 | LOW - 0 | Sacred Ibises are very adaptable and demonstrate behavioural flexibility allowing them to adapt to a range of environments. For a review of their adaptability see Clergeau & Yésou (2006). |
| 1.28 | How likely is it that low genetic diversity in the founder population of the organism will not prevent establishment? | unlikely - 1 | LOW - 0 | Introduced populations in France have successfully established from a very small number of founders (e.g. 30 individuals that escaped from a zoo established the population in western France that now contains around 3,000 individuals). |
| 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 many - 4 | LOW - 0 | It has successfully established breeding populations in the Canary Islands (5 pairs), France (1,205 pairs, more than 3,000 individuals), Italy (25-28 pairs), the Netherlands (7 pairs), Spain (occasional breeding records, small breeding colony in Barcelona eradicated in 2001), United Arab Emirates (c. 10 pairs in 1999) and the United States of America (Florida: more than 100 individuals, breeding in at least 3 colonies). Also found in Portugal (1 breeding record in 1998), Belgium (nest constructed in 2001, but no successful breeding) and occasional records from a number of other countries in western Europe. |
| 1.30 | How likely is it that the organism could survive eradication campaigns in the Risk Assessment area? | unlikely - 1 | MEDIUM -1 | Eradication could be successful if implemented when the species is in the process of establishment and the population is still small. However, in order to eliminate the risk of further introductions it would be necessary to eradicate the established introduced populations in other parts of Europe, particularly France and the Netherlands. This may be more difficult, particularly in France where the population is now quite large. However, it should be feasible given adequate resources. |
| 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)? | likely - 3 | LOW - 0 | Further escapes from zoos or collections in the UK are likely to occur, and vagrancy from established introduced populations in continental Europe could still occur unless these populations are eradicated. |

| | Spread | RESPONSE | UNCERTAINTY | COMMENT |
|-----|---|-----------------------------|--------------------|---|
| 2.1 | How rapidly is the organism liable to spread in the Risk Assessment area by natural means? | intermediate - 2 | LOW - 0 | Despite rapid growth of the introduced population in western France there have been only a few records of Sacred Ibises in the UK in recent years. However, if a breeding population begins to establish in the UK, subsequent spread is likely to be more rapid. |
| 2.2 | How rapidly is the organism liable to spread in the Risk Assessment area by human assistance? | slow - 1 | LOW - 0 | Escapes can occur from zoos or other collections of captive birds, but these are likely to be relatively infrequent and normally only one or two individuals could escape at one time (there are no known collections of free-flying "captive" Sacred Ibises in Britain, such as those that escaped from the zoological parks in France). |
| 2.3 | How difficult would it be to contain the organism within the Risk Assessment area? | with some difficulty - 2 | MEDIUM -1 | Sacred Ibises are highly mobile and could easily move to other areas. |
| 2.4 | Based on the answers to questions on the potential for establishment and spread define the area endangered by the organism. | | LOW - 0 | The entire risk assessment area could be at risk, although southern parts of Great Britain are likely to be colonised first. |

| | Impacts | RESPONSE | UNCERTAINTY | COMMENT |
|------|---|--------------------------|-------------|---|
| 2.5 | How important is economic loss caused by the organism within its existing geographic range? | minimal - 0 | MEDIUM -1 | No major economic impacts found, but there may be some environmental health concerns where large numbers of Sacred Ibises congregate in areas close to human habitation, where they may scavenge from rubbish bins, rubbish dumps or silage/slurry pits. |
| 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) | minimal - 0 | MEDIUM -1 | No major economic effects found. |
| 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 | No major loss in profits likely. |
| 2.8 | How great a reduction in consumer demand is the organism likely to cause in the Risk Assessment area? | minimal - 0 | MEDIUM -1 | No effect known. |
| 2.9 | How likely is the presence of the organism in the Risk Assessment area to cause losses in export markets? | unlikely - 1 | MEDIUM -1 | If diseases are transferred to poultry, export could be affected but risk is low. |
| 2.10 | How important would other economic costs resulting from introduction be? (specify) | moderate - 2 | MEDIUM -1 | Reasonable funds required for initial population reduction and then moderate funds required for monitoring and ongoing control. |
| 2.11 | How important is environmental harm caused by the organism within its existing geographic range? | moderate - 2 | LOW - 0 | Birds from the established population of introduced Sacred Ibises in France have been recorded to predate the eggs or chicks of a wide range of bird species including terns, egrets, ducks, seabirds and waders (Clergeau & Yésou 2006). In one incident, two Sacred Ibises were recorded to take all the eggs from a 30-nest Sandwich Tern <i>Sterna sandvicensis</i> colony in a few hours, causing the terns to desert the colony for the rest of the season, and similar incidents have been recorded with other tern species (Yésou & Clergeau 2005). Predation by Sacred Ibises was one of the biggest causes of mortality in a South African seabird colony (Williams & Ward 2006). They may outcompete native Little Egrets <i>Egretta garzetta</i> and Cattle Egrets <i>Bubulcus ibis</i> for nest sites (Kayser <i>et al.</i> 2005, Yésou & Clergeau 2005). Should Sacred Ibises become established in the UK, nest predation, particularly of threatened ground-nesting species, could be a conservation issue in any area where a population of Sacred Ibises occurs. Eradication of non-native Sacred Ibises has been recommended in France and in Florida because of conservation concerns (Clergeau <i>et al.</i> 2005; Herring & Gawlik 2007). |
| 2.12 | How important is environmental harm likely to be in the Risk Assessment area? | moderate - 2 | MEDIUM -1 | If Sacred Ibises became established in the UK it is likely that they would have similar impacts on native waterbirds, particularly terns and seabirds, as has been recorded elsewhere in their introduced and native range. This could have a major impact if endangered species were targeted by the Sacred Ibises, or if a large population of Sacred Ibises became established in Britain. However, a small introduced population would have a more moderate (and probably localised) effect. |
| 2.13 | How important is social and other harm caused by the organism within its existing geographic range? | minor - 1 | MEDIUM -1 | Sacred Ibises may cause minor nuisance and environmental health concerns by scavenging from rubbish bins close to human habitation (Yésou & Clergeau 2005). |
| 2.14 | How important is the social harm likely to be in the Risk Assessment area? | minor - 1 | MEDIUM -1 | See 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 | No genetically similar native species exist. |
| 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? | very likely - 4 | LOW - 0 | There are few natural predators likely to pose a threat to adult Sacred Ibises - in their native range predation by some species of eagles may occur, but in Britain our native eagle species are unlikely to occur in the same locations as introduced Sacred Ibises. Some predation of eggs or chicks by mammals or birds could occur, but this is unlikely to have a significant affect on population growth. |
| 2.17 | How easily can the organism be controlled? | with some difficulty - 2 | MEDIUM -1 | Control would be easier and more feasible if implemented when the population was small and in the first phases of establishment. Once a population has established control would be more difficult and costly. Most likely methods of control include shooting or destruction of eggs. Although this is feasible given the will and the resources, such a campaign would be necessarily visible to the public and as such may prove controversial. |
| 2.18 | How likely are control measures to disrupt existing biological or integrated systems for control of other organisms? | unlikely - 1 | LOW - 0 | Several methods of extermination (e.g. shooting, nest disruption) are very specific and will cause minimal disruption to other organisms. |
| 2.19 | How likely is the organism to act as food, a host, a symbiont or a vector for other damaging organisms? | likely - 3 | MEDIUM -1 | They could carry diseases that could be damaging to native birds and potentially to the poultry industry and even to humans. |
| 2.20 | Highlight those parts of the endangered area where economic, environmental and social impacts are most likely to occur | | | Environmental impacts are likely to be seen throughout the risk assessment area if colonisation occurs, although areas with large numbers of nesting terns and seabirds are likely to experience the most severe impacts. Social impacts are likely to occur close to areas of human habitation. |

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| Summarise Entry | likely - 3 | MEDIUM -1 | Sacred Ibises have already established non-native populations in several countries, including in western Europe. Individual birds are occasionally found in Britain, and with introduced populations in the near-continent spreading rapidly, and occasional escapes from captivity occurring in the Britain, it seems likely that Sacred Ibises could establish wild breeding populations in Britain in the near future. |
| Summarise Establishment | likely - 3 | LOW - 0 | Sacred Ibises have successfully established populations in a number of countries with similar ecoclimatic conditions to Great Britain, and in France their populations have increased at an exponential rate since introduction occurred. It is likely that populations could become established in Britain. |
| Summarise Spread | rapid - 3 | MEDIUM -1 | Sacred Ibises are highly mobile and have established breeding colonies hundreds of kilometres from the site where they were introduced in France. If they began breeding in the UK it is likely that similar, fairly rapid, spread could occur. |
| Summarise Impacts | major - 3 | MEDIUM -1 | Sacred Ibises can have serious impacts on other bird species due to predation of eggs and chicks. Colonial-nesting species such as terns and seabirds are particularly vulnerable. They could cause nuisance or environmental health concerns by scavenging from rubbish bins in areas of human habitation. It is possible that they may also carry disease which could be harmful to poultry, native fauna and humans. |
| Conclusion of the risk assessment | MEDIUM -1 | | Sacred Ibises already occur occasionally in the risk assessment area, but usually only single birds are seen. The risk of further introductions either due to escape from captivity in the UK, or due to spread from the established and expanding introduced populations in the near-continent, remains likely. The potential for impact on native fauna, particularly terns and seabirds, is high. |
| Conclusions on Uncertainty | | MEDIUM -1 | This risk assessment is based on scientific literature relating to existing populations of Sacred Ibises both in their native range and where they have been introduced. There is no uncertainty about the fact that Sacred Ibises have established introduced breeding populations in several other countries, nor is there uncertainty about the potential for negative impacts on native fauna, although the magnitude of such impacts is uncertain. Although further research would fill in some gaps of knowledge, it does not appear necessary to back up the substantive conclusions of this risk assessment. |

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