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HIGHLY PATHOGENIC AVIAN INFLUENZA – H5N1

RECENT DEVELOPMENTS IN THE EU AND THE LIKELIHOOD OF THE INTRODUCTION INTO GREAT BRITAIN BY WILD BIRDS

An update and a Commentary
Working Document - Version 1

Prepared by:
Dr Mirzet Sabirovic
Simon Hall
Prof John Wilesmith
Dr Nick Coulson

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1 Summary

This document considers the most recent H5N1 HPAI epidemiological developments in the European Union. It builds upon previous risk assessments which considered various pathways by which the virus might be introduced into the UK. These are: legal trade; illegal imports; intra-community trade; other activities and mechanical transmission by people and wild birds. Overall, we considered that there was an increased but still low likelihood that the virus may be introduced from the affected areas to the UK. Risk mitigation measures regarding these pathways are subject to ongoing review and appropriate activities in order to mitigate a potential likelihood of the introduction of the virus.

The most recent detections of HPAI H5N1 in the EU occurred in June and the beginning of July 2007. The original case of infection was detected in domestic poultry in the Czech Republic. Subsequent detections have been confirmed from wild waterbirds in the Czech Republic, Germany and north-eastern France (close to the border with Germany) and a hobby poultry flock in Germany. This is an evolving situation and further developments are likely.

Our previous risk assessments also recognised that wild birds may have a role to play in the introduction and dissemination of virus. They also considered that the risks should be reviewed should the virus be detected in wild birds in areas within the major migratory flyway that may involve direct movements to Great Britain.

Given the detection of the virus in wild birds in the EU, the primary focus of this assessment was on the potential movements of wild birds from the currently affected areas in the EU to Great Britain. Although this paper provides detailed analysis of the movement of wild birds between Great Britain and the Czech Republic, it is likely that wild birds in southern Germany will undertake similar movements, and hence pose a similar level of incursion risk.

The analysis suggests that wild birds occurring in the area where HPAI H5N1 infection was originally confirmed in the Czech Republic will migrate to Great Britain at some point in between early autumn and early winter. That is:

a) It is highly likely that three species of wild birds (Black-headed Gull *Larus ridibundus*, Pochard *Aythya ferina* and Mallard *Anas platyrhynchos*) will arrive in Great Britain within the next three months. Black-headed Gulls may arrive in Great Britain as early as July 2007. The other migrant species are unlikely to arrive in large numbers before September 2007.

b) Lapwing *Vanellus vanellus*, Gadwall *Anas strepera* and Tufted Duck *Aythya fuligula* are less likely to arrive in Great Britain in the autumn. It should be noted that Great Britain appears to be on the edge of the wintering range of these populations in the currently affected areas, so a much smaller number of individuals are likely to occur here. Similarly, although Teal *Anas crecca,* Shoveler *Anas clypeata* and Common Snipe *Gallinago gallinago* are likely to occur here, based on the pattern of migration, the numbers breeding in the affected areas are low, so the likelihood of their arrival to Great Britain is lower (though passage of other birds through the affected area may be significant). It should be noted that there are other species, not covered by the Migration Mapping Tool (see Section 3.2.3.3) that may migrate to Britain

from the Czech Republic. Very small numbers of Mediterranean Gulls *Larus melanocephalus* and Yellow-legged Gulls *Larus michahellis* move north and westwards in the autumn and may occur in Britain outside the breeding season, as shown for the former species by a small number of ringing recoveries.

c) A very few individuals of Blackbird *Turdus merula* and Black-necked Grebe *Podiceps nigricollis* are likely to migrate from the Czech Republic to Great Britain. Canada Goose *Branta canadensis* and Mute Swan *Cygnus olor* are highly unlikely to move to Great Britain.

This analysis suggests that it is possible that some wild birds identified in the risk profile may head towards the Great Britain in the coming months. Therefore, given the recent developments and the possible westward dissemination of the virus, we consider that the likelihood of the potential introduction of the virus to Great Britain has now increased if some of these wild birds become infected with the virus and manage to arrive here. Other pathways by which the virus may be introduced are also possible which emphasises the importance of appropriate enforcement and biosecurity.

Nevertheless, this risk assessment also acknowledges that conclusions are based on much uncertainty. These conclusions will continue to be subject to scrutiny when more structured information becomes available . Further developments are likely and Defra will continue to monitor these developments and re-assess the situation.

2 Introduction

This update and commentary builds on a number of our previous risk assessments (http://www.defra.gov.uk/animalh/diseases/monitoring/index.htm) that considered several pathways by which HPAI H5N1 may be introduced to the UK.

The information on outbreaks presented in this paper summarised HPAI H5N1 developments during the period from January 2007 and is current as of 11 July 2007 at 12.00 noon. The information on HPAI H5N1 outbreaks has been received from the European Commission (ADNS e-mail alerts and urgent faxes) and the World Organisation for Animal Health (OIE) unless otherwise stated.

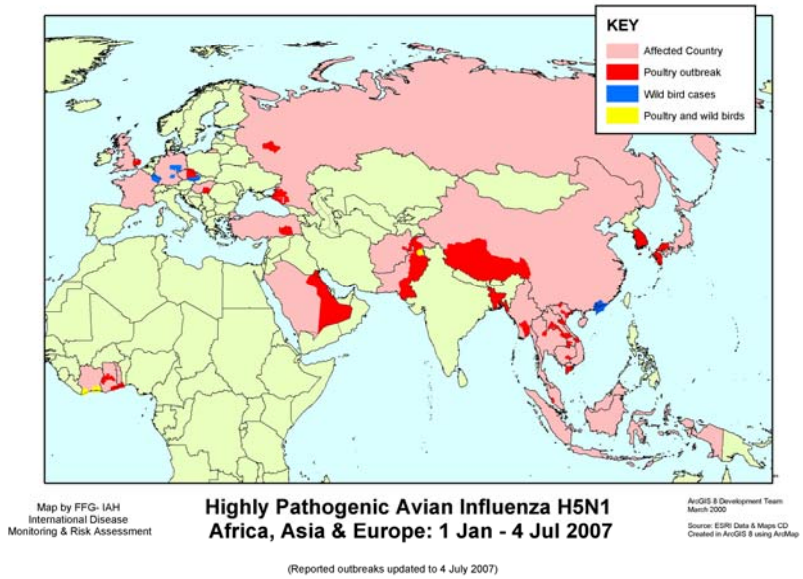
As a risk mitigation measure, EU rules prevent legal trade in specified risk commodities from the affected areas. In this paper we consider whether the H5N1 developments in EU in June and the beginning of July 2007 have altered the risks of the introduction of HPAI H5N1 virus to the UK by wild birds.

3 Official Disease Reports

3.1 Official reports

3.1.1 Worldwide

During January to 5th July 2007 the H5N1 virus continued to be reported sporadically across Asia, the Middle East, Europe and Africa. The most recent cases occurred in Europe, Asia, the Middle East, the Indian subcontinent and West Africa. In most countries these outbreaks primarily affected commercial poultry but also backyard poultry and a few captive zoo birds. There were also reports of H5N1 virus being detected in various wild birds worldwide.



The map indicates the location of officially reported outbreaks of HPAI H5N1 since the beginning of January 2007 until the 5th July 2007.

3.1.2 Europe

3.1.2.1 Russia

Russia reported cases of HPAI, virus type H5N1 in domestic poultry at three farms in the southern region of Krasnodar at the end of January. This was the first reported case of HPAI in Russia since July 2006. Russia also reported seven further outbreaks in various village and backyard poultry in the eastern region of Moskovskaya Oblast, close to Moscow. The source of this infection was thought to be a live bird market in the city. Control measures have been put into place. HPAI (H5N1) continued in February with two new outbreaks in backyard native chickens reported in March from Respublika Adygeya.

3.1.2.2 Turkey

Turkey reported seventeen outbreaks of H5N1 during February and March. The outbreaks occurred during February in various species of backyard poultry in the south eastern regions of Batman and Diyarbakir. There were no new outbreaks of HPAI (H5N1) since February and it appears that the event is now closed. There were a total of thirteen outbreaks in 2007. Prior to this, HPAI was last reported in Turkey in March 2006. Control measures include stamping out. Vaccination is prohibited.

3.1.3 European Union (January – February 2007)

3.1.3.1 Hungary

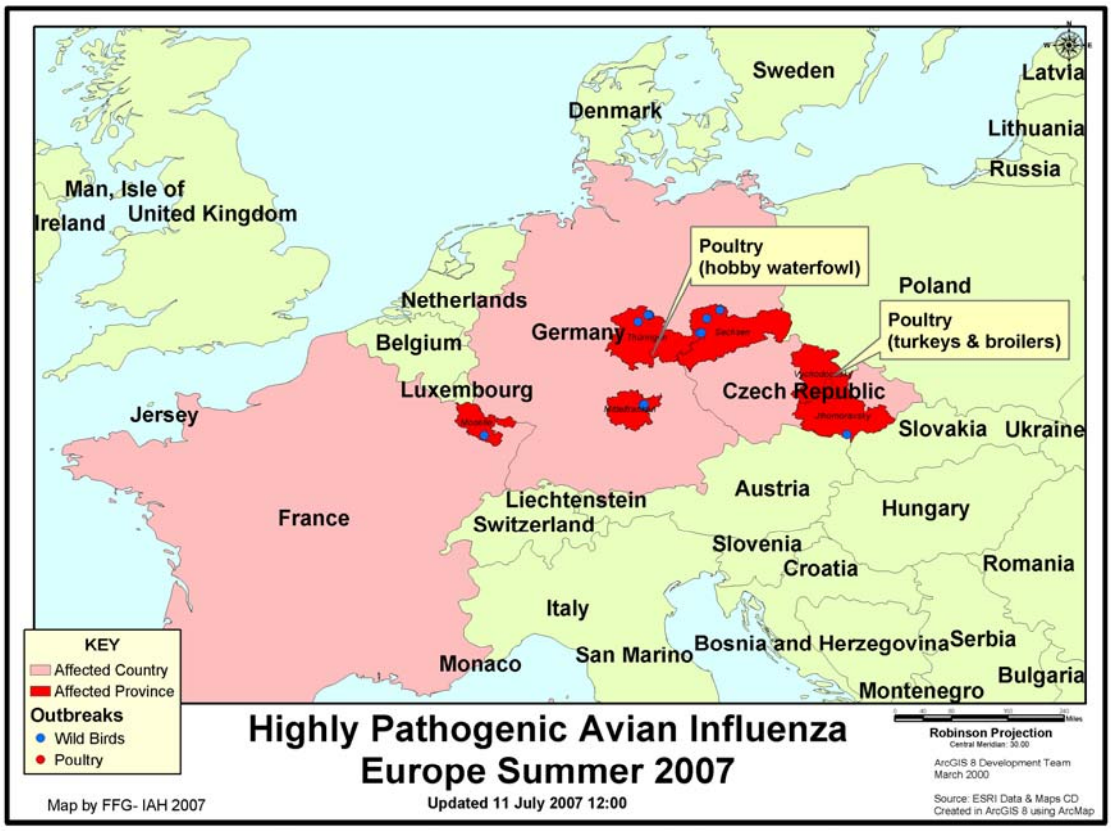
Hungary reported a case of highly pathogenic avian influenza, virus type H5N1 in a commercial goose flock in the central county of Csongrad in mid-January. A second case occurred a few days later within the same county. Before this, Hungary last reported HPAI in June 2006.

3.1.3.2 United Kingdom

The UK reported an outbreak of highly pathogenic avian influenza, virus type H5N1 in domestic turkeys at a commercial poultry farm in Suffolk, eastern England at the beginning of February. The source of the infection was investigated and control measures, including stamping out were put in place. This was the first case of H5N1 in the UK since March 2006, when a dead wild Whooper Swan *Cygnus cygnus* was discovered with the infection in Scotland. The outbreak of HPAI (H5N1) in domestic turkeys in Suffolk, in February is now considered to be over and all zone restrictions have been lifted. Vaccination of poultry is prohibited although zoo birds may be vaccinated under EU rules and strict controls.

3.1.4 European Union (late June – beginning of July 2007)

For illustrative purposes, the map below indicates the approximate location of officially reported outbreaks of HPAI H5N1 in the EU during June and the beginning of July 2007.



The timeline of the developments is given in Table 1

Table. 1. Timeline of confirmed outbreaks of H5N1 HPAI in Europe

	Week Ending on Friday											
COUNTRY	22/06/2007	29/06/2007	06/07/2007	13/07/2007								
Albania												
Austria												
Bosnia & Herzegovina												
Bulgaria												
Croatia												
Czech Republic												
Denmark												
France												
Germany												
Great Britain												
Greece												
Hungary												
Italy												
Poland												
Romania												
Serbia & Montenegro												
Slovakia												
Slovenia												
Spain												
Sweden												
Switzerland												
KEY		Wild birds				Poultry				Both		

3.1.4.1 Czech Republic

In June 2007, an outbreak of H5N1 was reported in a commercial turkey flock in Tisova, Usti nad Orlici, Pardubický in the central part of the country. A second outbreak was reported in commercial broilers at Norin, Usti nad Orlici, Pardubický, 4 km from the Tisova outbreak. These two outbreaks started on 19 and 25 June respectively. In a third incident, a Mute Swan (*Cygnus olor*) found dead at Lednice, Breclav, Jihomoravský (Moravia, in the south of the country), was also been found to have the H5N1 virus. Control measures including stamping out are in place. Vaccination is not allowed.

3.1.4.2 Germany

In June 2007, six waterbirds (five Mute Swans *Cygnus olor* and one Canada Goose *Branta canadensis*) found dead in Nürnberg (Bayern) in late June, have tested positive for H5N1. Three more Mute Swans, found dead in Frohburg, Sachsen (Saxony) also tested positive for H5N1. In a third incident a Black-necked Grebe *Podiceps nigricollis* found dead in Thuringia tested positive for H5N1. Vaccination of zoo birds is permitted but it is prohibited for poultry.

Germany also confirmed a number of new cases of HPAI H5N1 in wild birds (mostly Black-necked Grebe *Podiceps nigricollis*) found in the Kelbra reservoir in Saxony–Anhalt where more than 100 dead birds were found dead. These cases bring the number of confirmed HPAI H5N1 cases in wild birds to around 50, so far. It is likely that more cases will be detected in the near future.

The Nürnberg cases appear to be ongoing and it would appear that there is relatively slow transmission at these positive sites including the involvement of Mute Swans, Canada Geese and Greylag Geese *Anser anser*. Perhaps the greatest interest comes from the Thuringia sites where the principal affected lake is 6 km^2 and contains a population of some 70 breeding pairs of Black-necked Grebe. A large proportion of these birds appear to have died over a period of a week or so and within the last few days there has been mortality in Mute swans at this site. Two weeks prior to the first detection of mortality in the Black-necked Grebe there was a reported large congregation of Mute Swans which subsequently dispersed. This movement was associated with moult migration according to quotes by local ornithologists. There are additional cases at other sites in this region again involving Mute Swans (I. Brown, Veterinary Laboratories Agency, Weybridge, e-mail of 11 July 2007).

3.1.4.3 France

In July 2007, three juvenile Mute Swans were found dead in the vicinity of Metz (Moselle) close to the Luxembourg border and tested positive for H5N1. France has implemented EU control measures. Local ornithologists reported the arrival of a number of Pochard *Aythya ferina* just prior to the occurrence of the first mortalities. These birds are presumed to have arrived from eastern Europe and are known to occur at this site for autumn moult (I. Brown, Veterinary Laboratories Agency, Weybridge, e-mail of 11 July 2007).

3.2 Commentary

3.2.1 The virus

Preliminary analysis indicates that the two viruses isolated from separate poultry infection in the Check Republic share 100% identity. On the basis of available data, the Mute Swan isolate from the Czech Republic shows a very close relationship to those poultry viruses with a 99.6% identity (I. Brown, Veterinary Laboratories Agency, Weybridge, e-mail of 11 July 2007).

Phylogenetic analysis of the Czech isolate for HA1 reveals closest genetic similarity (99.5% at the nucleotide level) to recent viruses isolated from poultry and 'captive hunting' falcons in Kuwait in March 2007. It has also been reported that the isolate from a Mute Swan in Bavaria (Germany) is 99.2% homologous to the Czech isolate from turkeys. In addition, the other isolates (for which data are available) obtained from wild birds in Germany and France also group closely with the virus from the Czech Republic indicating a more widespread geographical dispersal of the virus within central and western Europe.

These isolates group more widely with contemporary and 2006 strains from the Middle East (to include Bangladesh, Pakistan, Azerbaijan). However, they are less closely related to other viruses isolated from both wild birds and poultry during the outbreaks in EU Member States in 2006. These most recent virus isolates in the EU also group separately from the viruses obtained during outbreaks in Hungary and the UK at the beginning of 2007. Nevertheless, they share 98.4% sequence similarity with the Asian-lineage H5N1 that originated in Qinghai (China) and Mongolia in 2005.

These findings suggest a new introduction of the virus into Europe.

3.2.2 The host

During the most recent developments, the virus was detected in domestic poultry (both turkeys and broiler hens) and dead wild birds (mainly wildfowl) over a broader geographic area. So far, on-going surveillance of wild birds in the rest of Europe has not resulted in positive findings. It is also possible that under ‘usual’ conditions the H5N1 virus may be present in wild birds at a very low level that is impossible to detect. Nevertheless, we have also considered that sporadic outbreaks may continue to occur within a wider region worldwide and in Europe leading to more outbreaks in the summer of 2007.

3.2.3 Wild bird movements

3.2.3.1 General

Generally the main migration period from Great Britain and western Europe towards northern and/or eastern breeding areas occurs from mid-February onwards. Typically birds breeding in more northerly Arctic areas commence their spring migration later, with those waders and geese that breed in the high Arctic not leaving

their temperate wintering grounds until at least May. Information on the timing of migration of some (quarry) species in each of the EU15 Member States has been published by the European Commission[1].

During late summer, wildfowl and some other groups of waterbirds simultaneously moult their wing flight feathers, making them flightless for a period of 4-6 weeks. Some waterbirds undergo a 'moult migration' (Salomonsen 1968), moving to sites where they are at lower risk of predation during this vulnerable period. Such migration can involve substantive (international) movements (for example Shelduck *Tadorna tadorna* migrate in early summer from all over north-west Europe as well as the west Mediterranean to the German Wadden Sea to moult. (Scott & Rose 1996). Others may undertake only small or local movements. Some species and individuals do not undertake a moult migration. Such movements generally occur between late June and August, but the timing varies between species, between sex (in ducks), and between regions (breeding occurs later at higher latitudes).

Apart from moult migrations, most waterbirds make only local, or at most short-distance, movements during late summer. Young birds may begin to disperse, and colonial breeding species (*eg* gulls) may make larger movements from the colonies once the young have fledged. Immature (one year old) gulls may not return to their breeding sites in the first summer and may begin autumn movements earlier than breeding birds. Birds may also congregate at favoured sites prior to long-distance migration. Many waders and other waterbirds such as seaducks, grebes and divers that breed in inland areas will move to coastal areas in the non-breeding season, with movements occurring from late July onwards (depending on latitude).

The timing and direction of movement of locally breeding birds is entirely species-specific. Many resident species will essentially stay on their breeding areas over-winter. Some of those high arctic waders which fail to breed successfully may rapidly leave the breeding areas and head south again, arriving in July, but most southerly and westerly movement occurs from early August, through September and October. EFSA have graphically summarised the direction and volume of migratory flows of swans, geese, ducks, and waders across Europe in autumn[2].

3.2.3.2 Movements of birds from Asia and the Middle East to Great Britain

The majority of migrating waterfowl (Anatidae) that pass through the Middle East migrate in autumn to eastern Africa from their breeding grounds in southern Siberia and pass through Arabian Peninsula and Caspian Sea region. This West Asian/East African flyway overlaps with Black Sea/Mediterranean flyway at the eastern end of the Mediterranean. Migratory passage will be interrupted by several stop-overs and typically take some weeks to complete. There appear to be no major or direct routes to the UK from this flyway. However, some species of waders and passerines (perching birds) migrate to the UK during spring from eastern Europe, Mediterranean, Far East and east Africa regions.

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[1] http://ec.europa.eu/environment/nature/nature_conservation/focus_wild_birds/species_birds_directive/pdf/intro_en.pdf and http://ec.europa.eu/environment/nature/nature_conservation/focus_wild_birds/species_birds_directive/pdf/index.pdf

[2] *e.g.* see Figures 5, 6 & 7 in http://www.efsa.europa.eu/etc/medialib/efsa/science/ahaw/ahaw_opinions/1484.Par.0005.File.dat/ahaw_addendum_ej357_migratorybirds_en.pdf

The June/July 2007 strain of H5N1 HPAI shows a high degree of homology to viruses isolated in the Middle East in 2007. To assess the possibility of the movement of wild birds from these areas to Great Britain we have checked for records of marked birds in Middle Eastern countries in June, July and August that had been recorded in Great Britain. There have been no ringed individuals of any species in Great Britain that have been recorded in these countries in June, July and August. There are only four records of movements of marked birds in the accumulated data between these countries and Great Britain: Tufted Duck *Aythya fuligula* from Pakistan (in April) and Pintail *Anas acuta* (January), Redwing *Turdus iliacus* (February) and Common Starling *Sturnus vulgaris* (December) from Azerbaijan.

3.2.3.3 Movements of birds from the Czech Republic, Germany and France to Great Britain

The original case in the current incidents of H5N1 HPAI (central Europe, mid-2007) was in a domestic turkey flock in the Czech Republic confirmed on 21 June. Cases of H5N1 HPAI have subsequently been identified from wild birds in central, eastern and southern Germany and north-eastern France.

The Defra-funded automated Migration Mapping Tool (MMT) was used to analyse movements of wild birds between the Czech Republic and Britain, in the context of the known migration patterns of these species. This analysis was carried out by the British Trust for Ornithology (BTO), United Kingdom. Details of the methodology can be found in Crick *et al* (2006).

Populations of wild birds in southern Germany are likely to follow similar movements to those in the Czech Republic as they are part of the same population. The situation in north-eastern France may be somewhat different, so the BTO investigated movements of birds to/from this area as well, supplementing the main risk assessment as appropriate.

Of the forty species available in the MMT, eleven were identified as occurring in the Czech Republic in the summer months (June to August) and potentially moving to or from Great Britain. Two additional species (Garganey *Anas querquedula* and Ruff *Philomachus pugnax*) are identified that may be relevant to the developments in France. Three species (Fieldfare *Turdus pilaris*, Redwing and Starling) are also present in both the areas of the Czech Republic and France, but only arrive in Great Britain in the winter months (October to March), so the likelihood of their arrival in the next few months from the outbreak area is considered unlikely and they were not considered further.

For the species considered to pose at least some likelihood of arrival to Great Britain, the analysis provided a qualitative assessment of the arrival of at risk species to Great Britain based on the following criteria:

a) How large is the breeding (or, where relevant, the passage) population in the currently affected area?

b) Is there evidence of a regular migration route connecting the two countries, or simply records of a few birds?

c) What is the timing of any movements, in particular are birds that are present in the Czech Republic in the period from June through August likely to move to Great Britain?

For evidence of movements we have relied largely on the MMT, supplemented by expert knowledge, where appropriate. Figures on breeding population size have been taken from Burfield and van Bommel (2004).

It should be noted that large numbers of birds are ringed each year in Great Britain (873,581 in 2005) and the Czech Republic (123,251 in 2003). However, between the two countries there is a large sample of birds ringed from which movements between the countries might be recorded. There is information for 165 birds (all species, not just from the MMT) that have moved between the two countries between 1909 and 2006**.**

3.2.3.3.1 Guide to the maps

For each species, the relevant movement map(s) have been created from the MMT. These maps provide an indication of the overall pattern of movement of birds between central Europe and Great Britain. For most species, birds from several different populations migrate to, or through, Britain.

The MMT distinguishes between these different populations, as they will have different migration patterns and timings, and so present differing degrees of incursion risk. We present maps from the MMT which show the pattern of recoveries of marked birds from relevant populations, i.e. those that occur in central Europe during the summer months and from which some birds are likely to migrate to Britain.

On the maps, each dot represents the recovery of an individually marked bird from the mapped population, the red and blue areas show the major areas of distribution, red areas account for 50% of all records and blue areas account for 99% of all records and the red lines join the mean locations of all recoveries from each month (these are identified by number as 1 for January to 12 for December). It is important to note that that the red lines provide only an average monthly location (the 'centre of gravity' of the population concerned and individual birds will range much further than this as indicated by the individual recoveries and the "kernels" on the maps).

3.2.3.3.1.1 Black-headed Gull (*Larus ridibundus*)

There have been 18 records of birds in the Czech Republic in the summer (June to August) that have occurred in Great Britain in the winter months (October to March), and one record of a bird present in the Czech Republic which has occurred in Great Britain in the summer months (a bird present in the Czech Republic in June and Great Britain in August).

British wintering birds come mostly from north-eastern Europe, particularly in the area around the Baltic Sea. The Czech Republic represents the southernmost fringe of this population. Birds from central Europe migrate west into western (mostly continental) Europe, arriving on the wintering grounds from July onwards.

It is highly likely that some birds from the Czech Republic will occur in Great Britain, and they may occur from July onwards. Counts of gull roosts in Great Britain in July and August are unavailable, though they are widespread and large numbers occur at many localities throughout Great Britain.

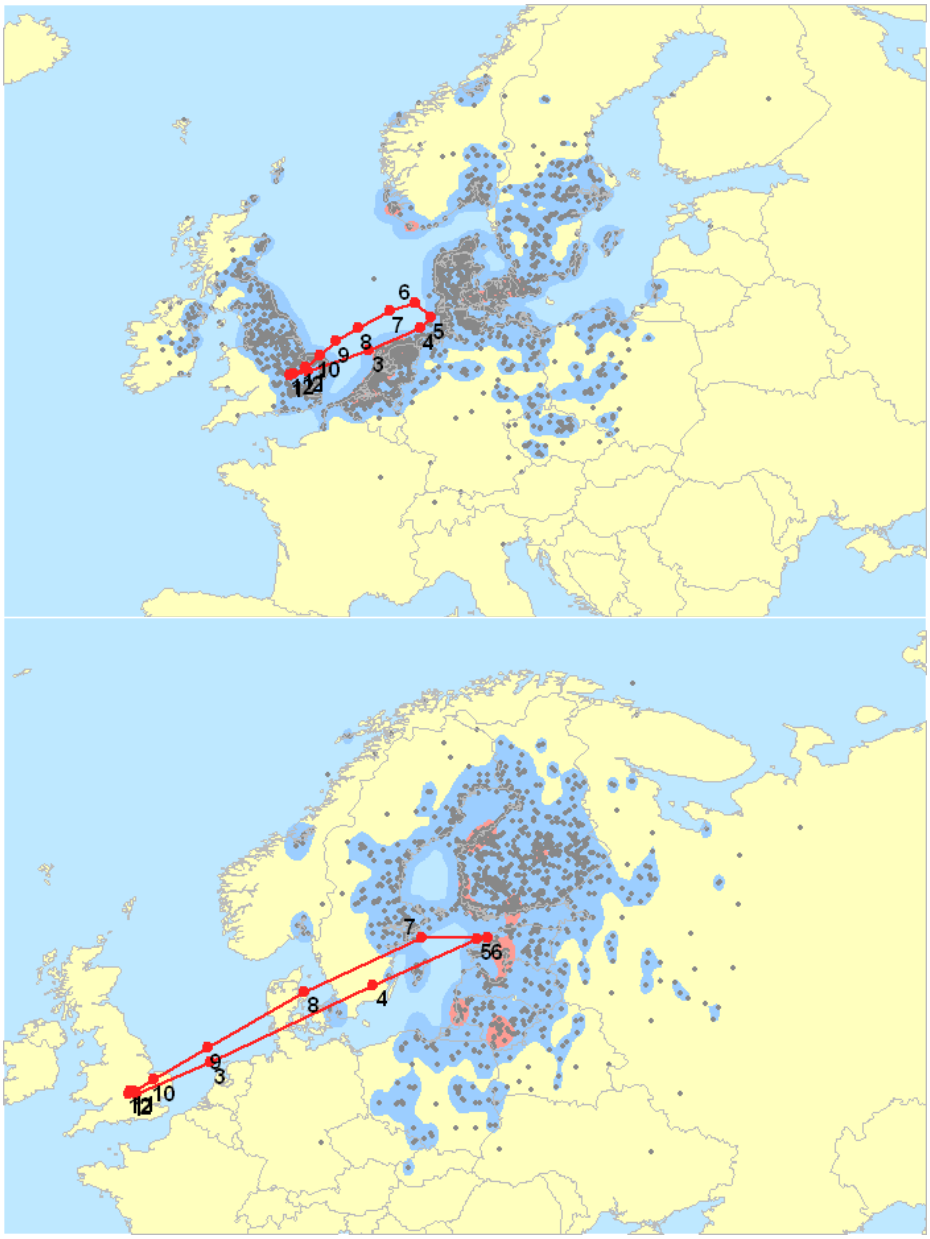

Fig.1. Movements of Black-headed Gull to and from Great Britain from breeding areas in the near Continent (above) and Baltic Sea basin (below)

3.2.3.3.1.2 Blackbird (*Turdus merula*)

There have been two records of Blackbirds ringed in the Czech Republic (one each in April and July) that have occurred in Great Britain in winter. Blackbirds are a common breeder throughout Europe, but populations in central Europe are largely resident, with perhaps some south-westerly dispersal. There is no established migration movement of Blackbirds between the Czech Republic and Great Britain. Similarly, most Blackbirds in Great Britain are largely sedentary while British wintering birds originate from northern Europe.

It is highly unlikely substantial numbers of this species move from the Czech Republic or southern Germany to Great Britain.

3.2.3.3.1.3 Gadwall (*Anas strepera*)

There are two records of Gadwall in June in the Czech Republic that have occurred in Great Britain (both in December).

Gadwall is a common breeder with increasing populations in central Europe (c. 2,000 pairs breeding in the Czech Republic, 3,000 to 5,000 breeding in Germany). Gadwall breeding in central Europe winter in Britain (the Czech Republic probably represents the extreme eastern edge of this breeding range). The wintering range of British breeding Gadwall is from southern Britain to south-western Europe. Gadwall breeding in the Czech Republic migrate west in autumn and winter mostly in France, with a few individuals wintering further north and south (in Britain and Spain respectively). It is likely that some birds from the affected areas will arrive in Britain, probably in the autumn.

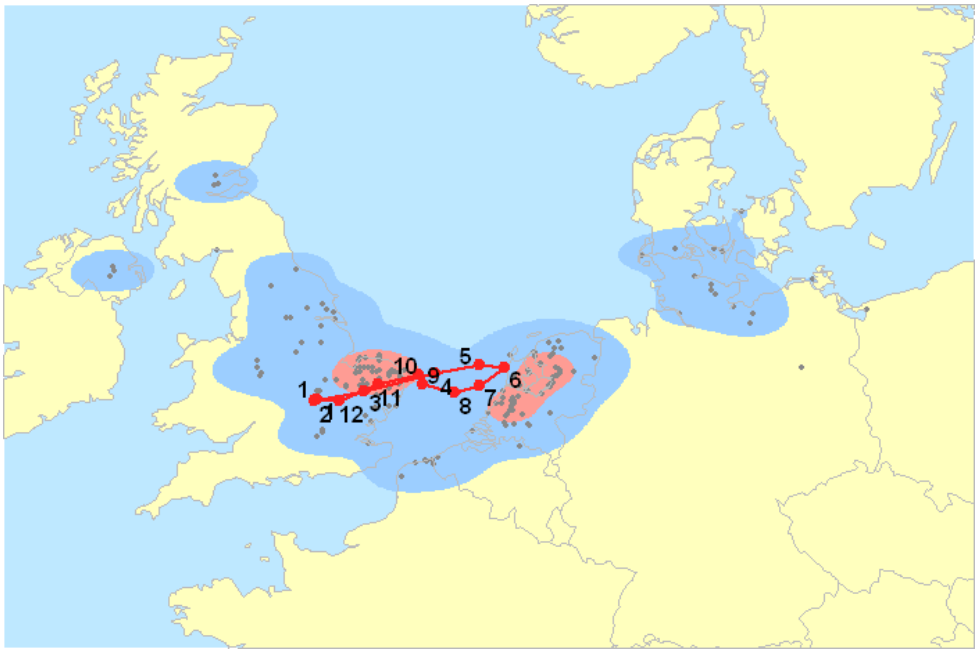

Fig.2. Movements of Gadwall to and from Great Britain from two populations identified by the MMT

3.2.3.3.1.4 Garganey (*Anas querquedula*)

Garganey breed in small numbers in northern France and southern Great Britain (and in larger numbers the further east in Europe) moving south in the autumn to spend the winter in Africa, mostly south of the Sahara. Garganey breeds sparsely throughout Europe, with greater numbers in eastern Europe (Poland and further east) but birds probably pass through both France and the Czech Republic in late summer and autumn. The number of Garganey in Great Britain is low (c. 100 breeding pairs), so the likelihood of incursion by this species is probably negligible.

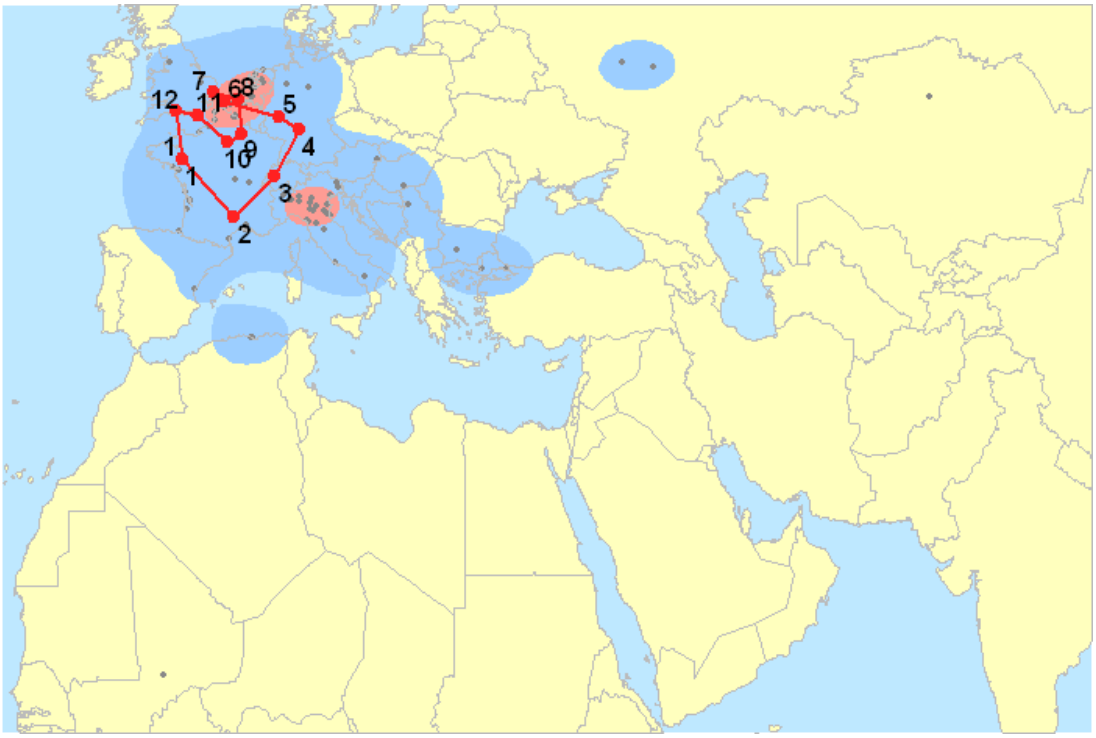

Fig.3. Movements of Garganey to and from Great Britain

3.2.3.3.1.5 Northern Lapwing (*Vanellus vanellus*)

There are six records of British-ringed Northern Lapwing occurring in the Czech Republic in May and one in June. Some of these may have been birds moving through the area to breeding grounds in, for example, western Russia.

Northern Lapwing is a common, but decreasing, breeding bird throughout Europe. There are 7,000 to 10,000 pairs breeding in the Czech Republic, for example. Most birds wintering in Great Britain breed in northern Europe, but the breeding range extends into central Russia. Birds breeding in Russia will pass through the Czech Republic on the return migration (July/August onwards).

It is likely that some of these birds will occur in Great Britain. However, the main arrivals of wintering Lapwings in Britain occur from October onwards and so the numbers arriving in the late summer are likely to be low.

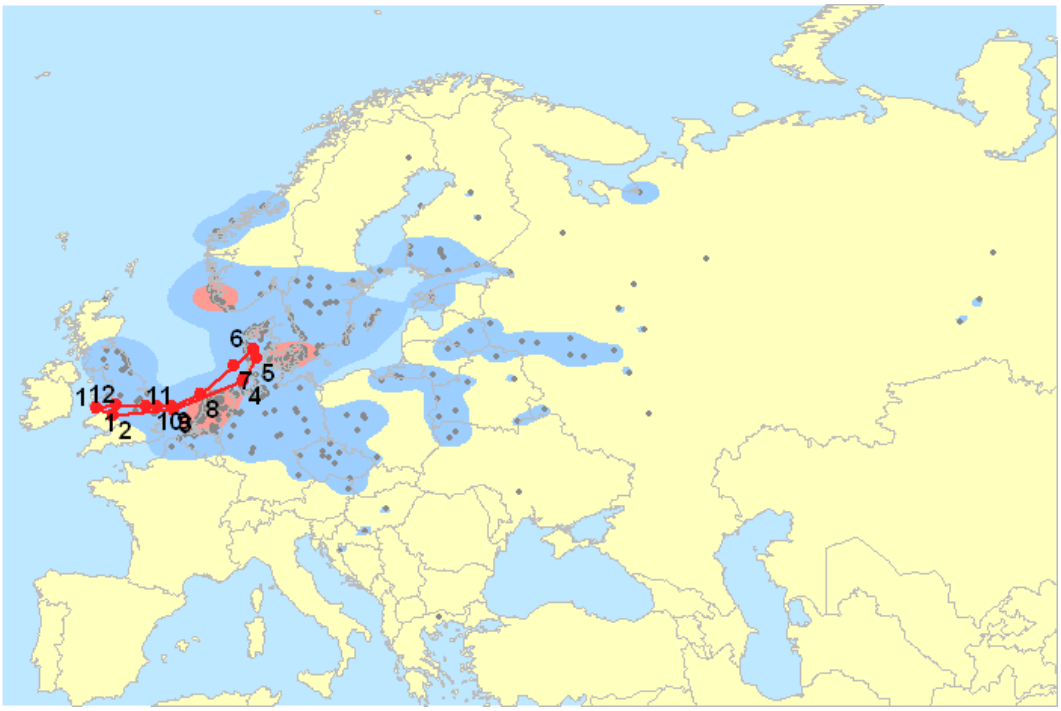

Fig.4. Movements of Lapwing to and from Great Britain

3.2.3.3.1.6 Mallard (*Anas platyrhynchos*)

There is one record of the movement of a bird ringed in the Czech Republic in August which was found in Great Britain in September.

Mallard breed in large numbers throughout Europe, with 25-45,000 pairs in the Czech Republic and 200-400,000 pairs in Germany. Most Mallard wintering in Great Britain originate from north-eastern Europe and northern Russia. Mallard breeding in central Europe winter in northwest Europe, some individuals wintering as far north and west as Great Britain although the fact that only a single ringing recovery exists suggests the numbers are not great.

It is likely that some birds from the affected areas will migrate to Great Britain, beginning to arrive for the winter in August. Given the large breeding population of this species, even a small proportion of birds from this area could mean a relatively large number of individual birds visiting Britain. In Britain, Mallard are extremely widespread with congregations of birds occurring at many sites, although immigrant birds are difficult to discern from resident populations.

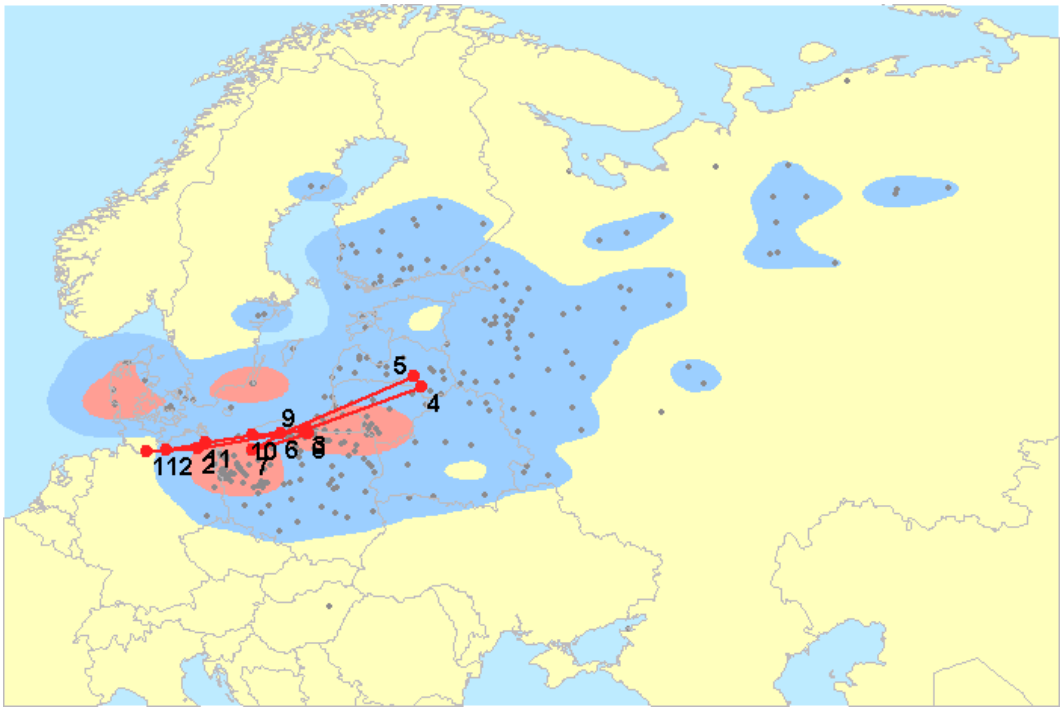

Fig.5. Movements of Mallard to and from Britain

3.2.3.3.1.7 Pochard (*Aythya ferina*)

There are 13 records of Pochard in the Czech Republic that have moved to or from Great Britain (all occurring in Great Britain in September to March).

Pochard is a common breeder in central Europe, with 9,000 - 17,000 pairs in the Czech Republic. Pochard wintering in Great Britain breed throughout central Europe eastwards into Russia. Pochard breeding in central Europe winter in western Europe, particularly the Netherlands and south-eastern Britain. They are also common in France, where they probably start arriving in the area in July/August, so there is an additional (small) likelihood of movement by this species from the affected area in north-eastern France.

It is highly likely that birds from the Czech Republic will occur in Great Britain. Most birds are unlikely to arrive in Great Britain before September, but some may arrive earlier. Unlike the other species identified as of higher risk, Pochard have a relatively localised distribution in Great Britain in autumn, while during winter they are found widely throughout the UK. Five sites have a peak July and August count of more than 500 birds, and two (both in southeast England) more than 1,000.

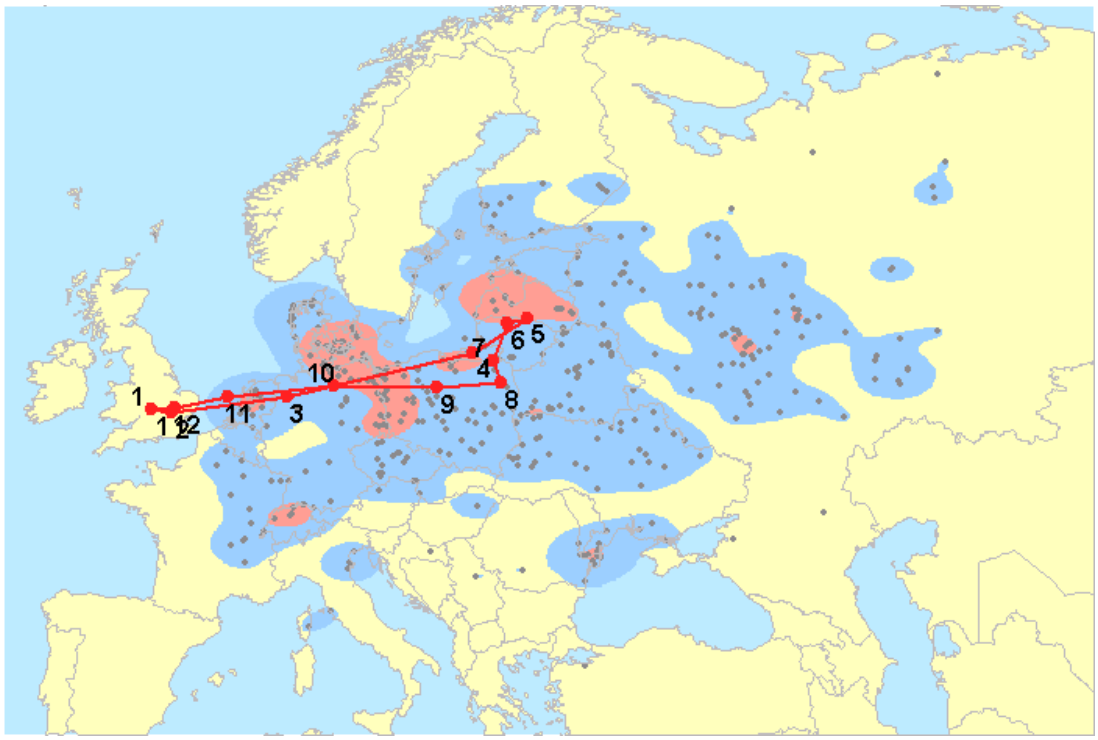

Fig.6a. Movements of Pochard to and from Great Britain from breeding areas in central Europe.

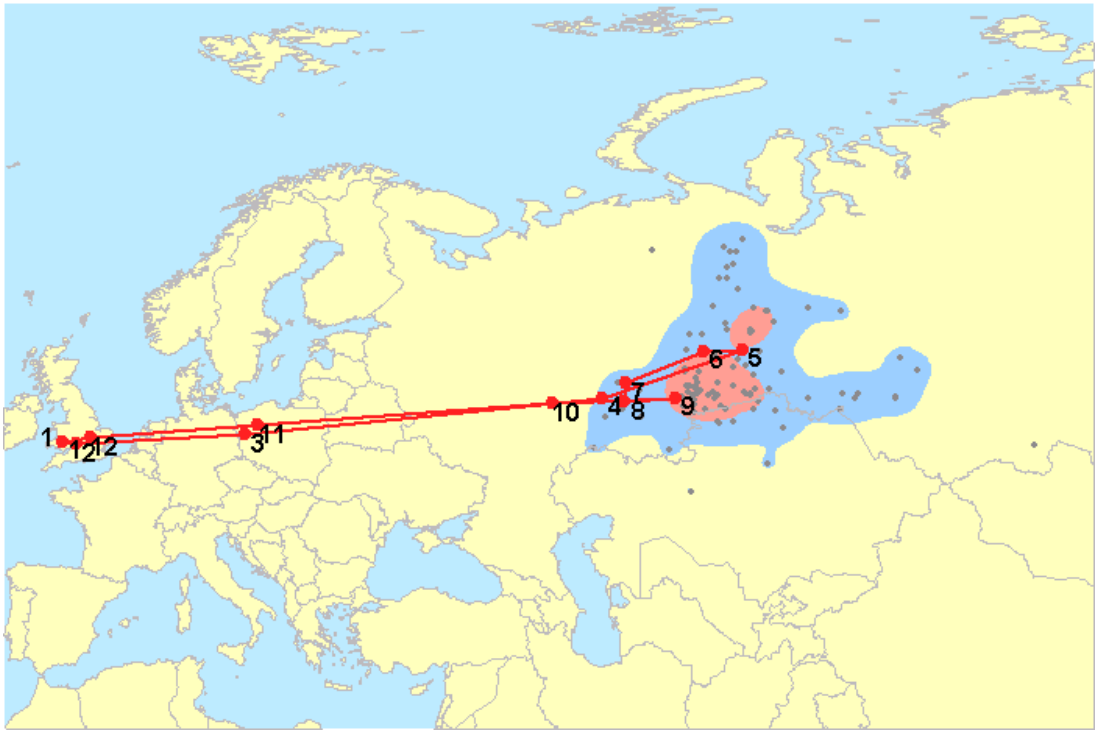

Fig.6b. Movements of Pochard to and from Great Britain from breeding areas in central Russia (these birds may break their migratory journey in central Europe).

3.2.3.3.1.8 Ruff (*Philomachus pugnax*)

Ruff breed in very small numbers in Great Britain. The majority of the European population breeds in Scandinavia, with significant numbers in the Baltic States, Poland, north Germany and the Netherlands. These birds move southwest, mostly to west Africa, for the winter and may pass through the currently affected area in France. However, the number of birds involved (occurring in Great Britain) is likely to be so small that they would pose a negligible likelihood of viral incursion to Britain should they be infected by H5N1. Most Ruff that occur in Britain breed in Scandinavia and Siberia, so are unlikely to pass through either area where H5N1 HPAI has been confirmed.

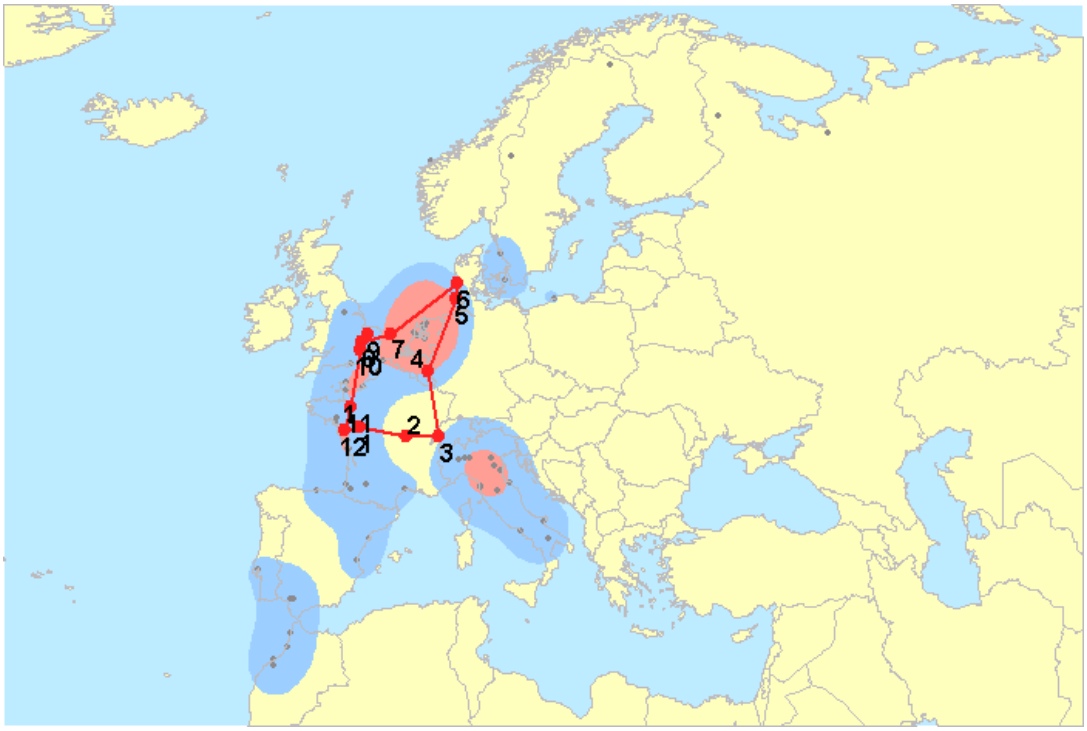

Fig.7. Movements of Ruff to and from Great Britain

3.2.3.3.1.9 Shoveler (*Anas clypeata*)

There is one recorded movement of a bird in the Czech Republic in July that occurred in Great Britain in September.

Shoveler is a scarce breeder in central Europe, with only around 100 pairs in the Czech Republic. Great Britain's wintering birds originate from an area stretching from the Baltic States to north-eastern Russia. Populations breeding in central Europe winter mostly in an area from the Netherlands through into France, with some birds probably occurring in south-eastern Great Britain.

It is unlikely that substantial numbers of British wintering birds originate from the Czech Republic.

3.2.3.3.1.10 Common Snipe (*Gallinago gallinago*)

There are seven records of Common Snipe in the Czech Republic moving to Great Britain, all birds occurring in Great Britain in the winter (October to January).

Great Britain's wintering population of Common Snipe originates from central and northern Europe into western Russia; the Czech Republic is at the southern edge of this breeding range. Few Common Snipe are likely to breed in the area, with the total population in the Czech Republic being 500-800 'pairs'.

It is likely that Common Snipe from the Czech Republic will arrive in Great Britain (though in small numbers), but unlikely that birds will arrive before October.

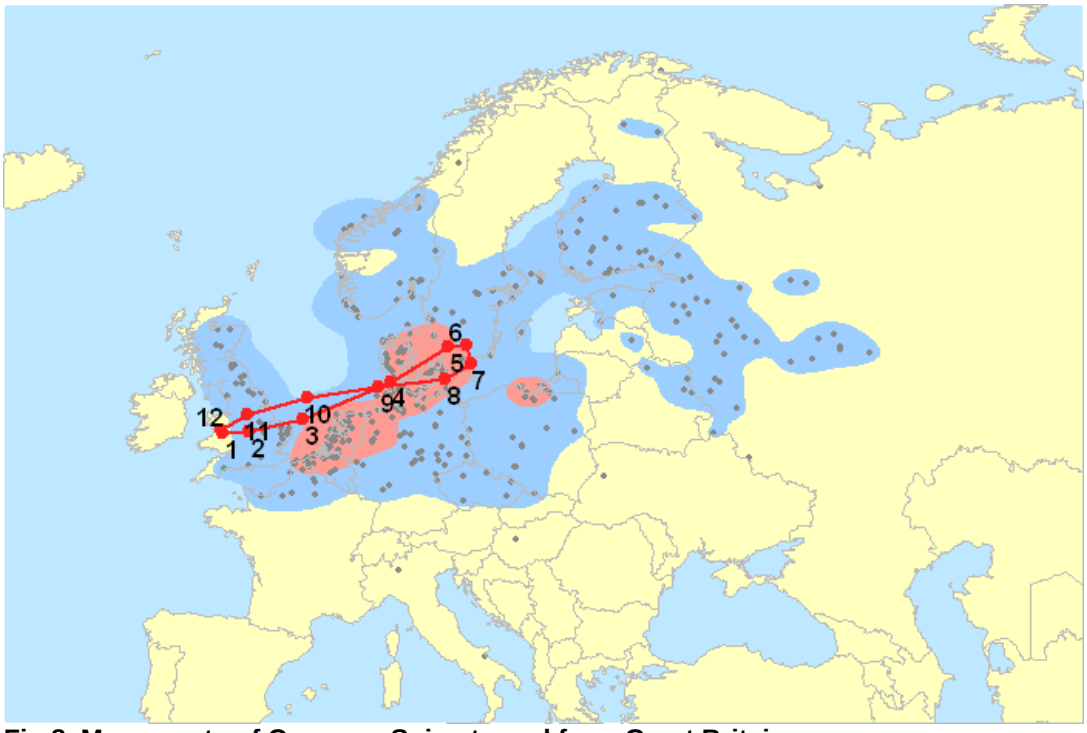

Fig.8. Movements of Common Snipe to and from Great Britain

3.2.3.3.1.11 Teal (*Anas crecca*)

Four birds occurring in the Czech Republic in July and August have moved to or from Great Britain, all recorded in Great Britain in October to December.

Teal is a common breeder in northern Europe, but much scarcer in central Europe, fewer than 100 pairs are thought to breed in the Czech Republic. Teal breeding in a wide area of eastern Europe winter in Great Britain, though most birds originate from north-eastern Europe (around the Baltic Sea). Teal in the Czech Republic comprise a mix of breeding birds and birds on passage from breeding grounds further east into western Asia. These birds mostly migrate west in winter into western Europe. Early birds may start arriving back in August, but the majority of birds arrive on their wintering grounds from September onwards.

It is highly likely that birds from this area will occur in Great Britain, though primarily in the winter months. It is unlikely that many birds will arrive before September and overall the number of birds migrating between the infected area and Great Britain is likely to be small.

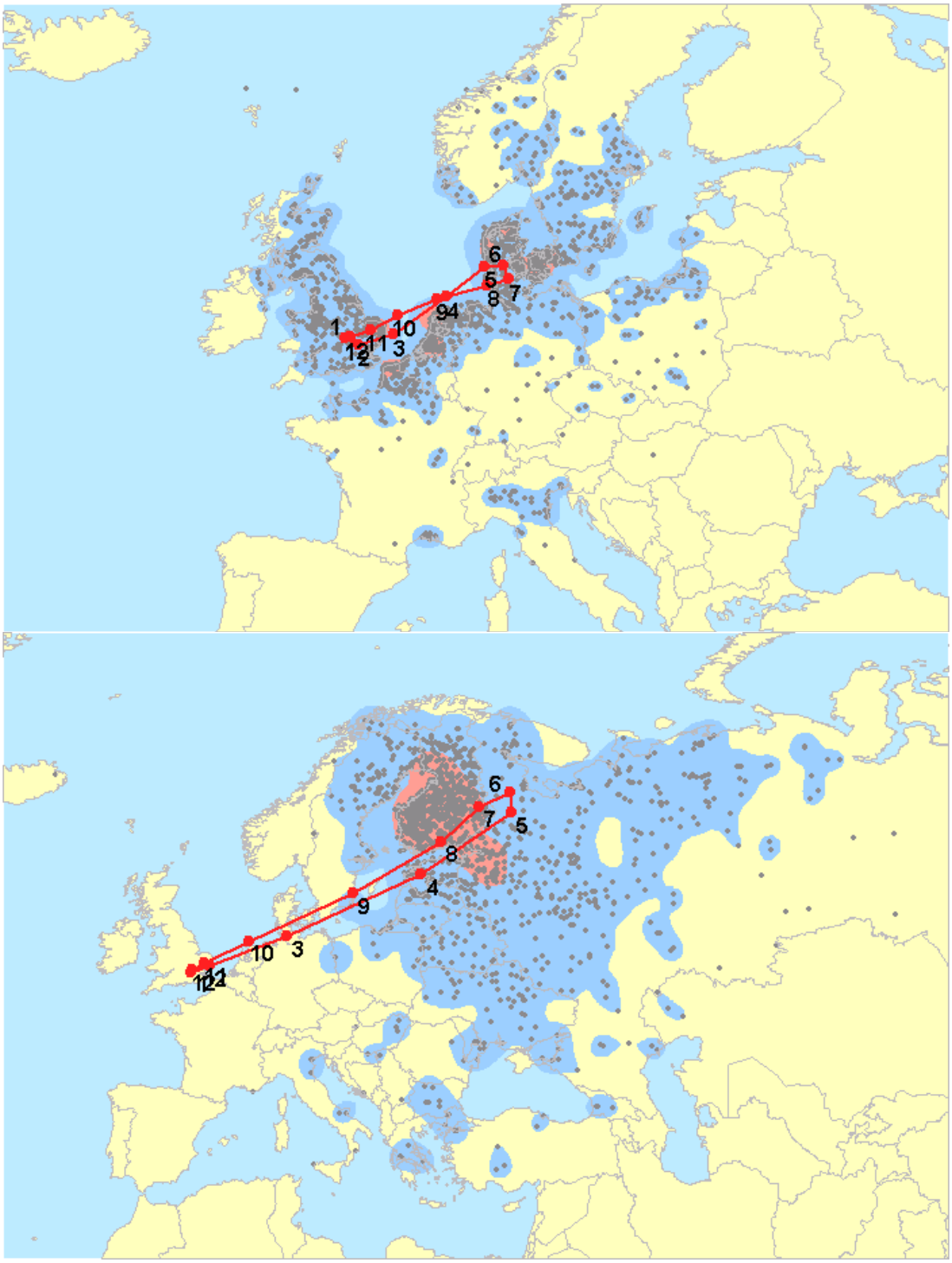

Fig.9. Movements of Teal to and from Great Britain from two breeding areas, one relatively close to Britain and one more distant to the north and east

3.2.3.3.1.12 Tufted Duck (*Aythya fuligula*)

There have been seven records of Tufted Duck in the Czech Republic in June to August moving to or from Great Britain (all Great Britain occurrences in October to February).

Most Tufted Duck wintering in Great Britain originate from north-eastern Europe and Russia. Although a few birds have been recovered in the Czech Republic, it is to the south of the main breeding range of Great Britain wintering Tufted Duck. Tufted Duck is a common breeder in central Europe, with 12-24,000 pairs breeding in the Czech Republic and a similar number in Germany. Tufted Duck breeding on the near continent (the Netherlands and northern France) also winter in Great Britain, although birds from this population may occur near the infected area in France, the numbers involved are likely to be extremely small, particularly during July and August, so this poses little additional likelihood of incursion to Great Britain.

It is likely that some birds from the Czech Republic will arrive in Great Britain, but it is unlikely that there will be large numbers, or that they will arrive much before October.

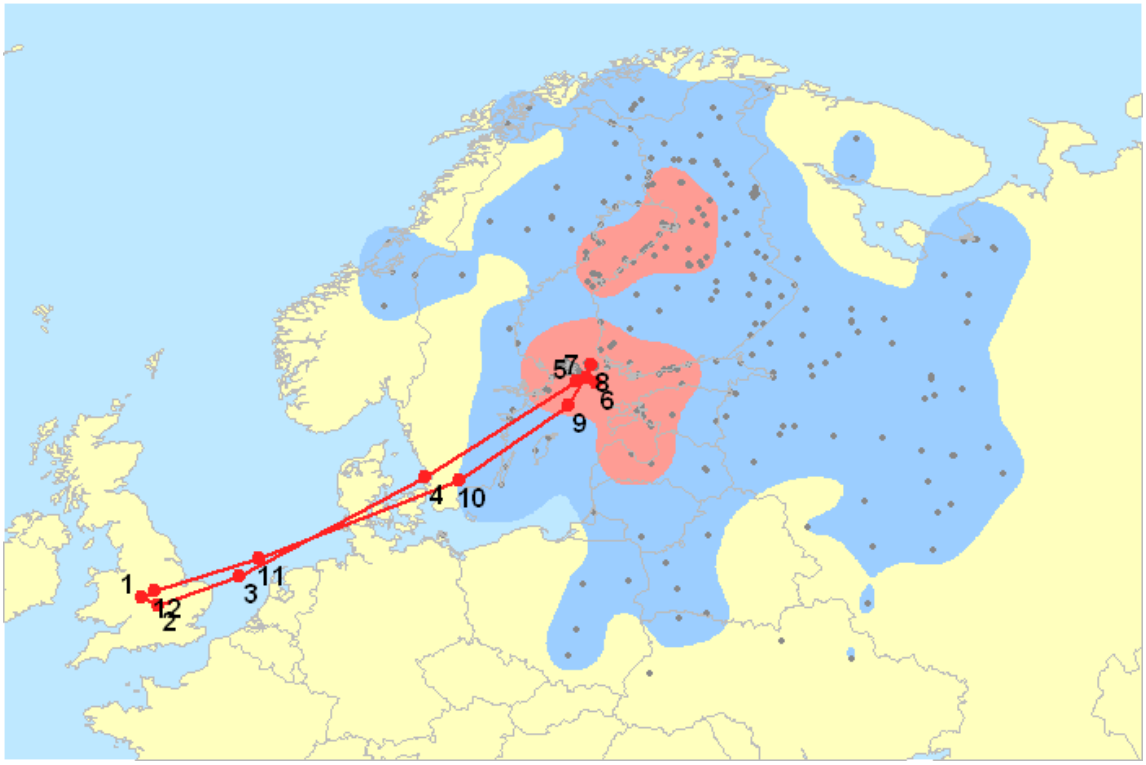

Fig.10a. Movements of Tufted Duck between Great Britain and breeding ranges to the north and east.

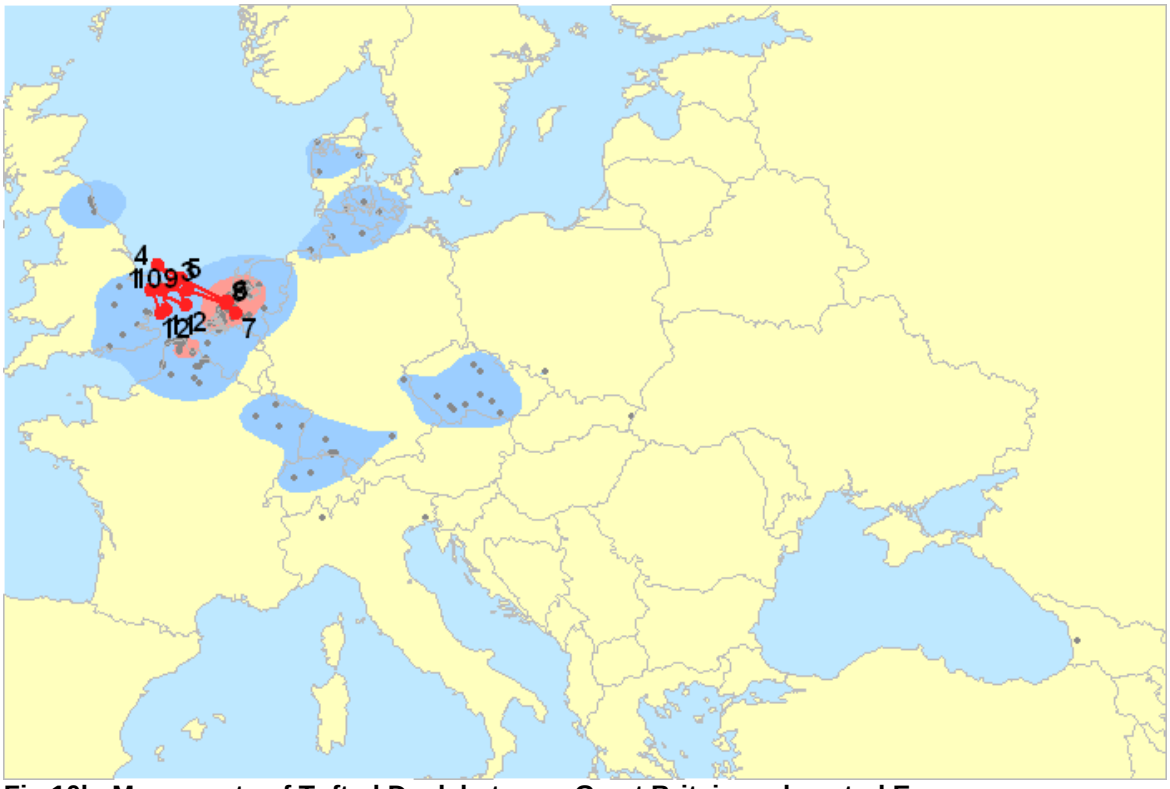

Fig.10b. Movements of Tufted Duck between Great Britain and central Europe

3.2.3.3.1.13 Other species potentially involved

Subsequent to the initial Czech case (recorded in poultry), H5N1 has been recorded in three species: “wild” (Mute) swan, Black-necked Grebe and Greater Canada Goose in southern Germany and eastern France (close to the German border).

3.2.3.3.1.13.1 Mute Swan (*Cygnus olor*)

Mute Swan is a common breeder throughout Europe, with 400-500 pairs breeding in the Czech Republic and 8,000 to 13,000 breeding in Germany (though note many of these will be in the north of the country well away from the infected areas). There is a mix of sedentary and migratory populations of Mute Swan in Europe; those in central Europe are probably rather sedentary, so they are highly unlikely to migrate to Great Britain and consequently pose little risk of viral incursion.

3.2.3.3.1.13.2 Black-necked Grebe (*Podiceps nigricollis*)

Black-necked Grebe is a scarce breeder in central Europe with 400 to 800 pairs in the Czech Republic and 1,500-2,000 pairs in Germany. It is migratory and dispersive, wintering on lakes and coastal waters. Birds from central Europe are likely to winter on the Atlantic and Mediterranean coasts of Europe.

It is unlikely that more than a few birds from the Czech Republic would visit Great Britain, and in any case, the number of Black-necked Grebes wintering in Great Britain is very small (just 120 are estimated to occur in an average winter). However, it should be noted that the movements of this species are very poorly known.

3.2.3.3.1.13.3 Greater Canada Goose (*Branta canadensis*)

Canada Geese are an introduced species breeding throughout much of Europe. In many areas they are largely sedentary (though some populations undertake moult migrations), so it is unlikely that birds from the infected areas will migrate to Britain. The bird found dead in Germany is believed to be semi-domestic.

In summary, Table 1 outlines the analysis presented above and provide a qualitative assessment based on information from the MMT, knowledge of the populations size and distributions and assessment by experts from BTO, JNCC, RSPB, WWT and the Scottish Executive.

Table 1. Summary of the risk factors for the incursion of AI in Britain represented by the 11 species of wild bird for which movements of marked individuals has been recorded between the Czech Republic and Great Britain and the three species in which H5N1 has been confirmed (marked in red colour).

Species	CZ Breeding Population (pairs)	Likelihood of occurring in Great Britain	Month of Arrival
Black-headed Gull	50,000-100,000	High	July
Black-necked Grebe	400 – 800	Low	October
Blackbird	2 – 4 Million	Low	October
Canada Goose	Not Available	Very Low	-
Gadwall	2,000	High	September
Northern Lapwing	7,000 – 10,000	Moderate	October
Mallard	25,000 – 45,000	High	August
Mute Swan	440 – 500	Very Low	-
Pochard	9,000 – 17,000	High	September
Shoveler	c. 100	Moderate	October
Common Snipe	500 – 800	Moderate	October
Teal	< 100	Moderate	September
Tufted Duck	12,000 – 24,000	Moderate	October

4 Conclusions

Phylogenetic analysis of the most recent isolates obtained from the currently affected areas in the EU suggest wider dissemination of the virus within central and western Europe. These events also suggest that this is a new introduction of the virus into Europe.

It is currently difficult to interpret the current spatial and temporal pattern of outbreaks of HPAI H5N1 in central Europe against known movements of wild birds. It is also unknown what bird species, if any, are responsible for moving the virus between the current foci of infection. Most of the species infected in the outbreaks would be resident (non-migratory) in the areas concerned. The timing of initial and current

occurrences are not in periods of significant (water)bird migration. However, local wild bird movements will be taking place at this time, and the possibility that they are involved in the dissemination of cases cannot be excluded.

Several species considered in this assessment will head towards Great Britain in the coming months. Although the numbers involved are likely to be small until at least mid or late August, only a proportion of the waterbirds in the currently affected areas in the EU will move to Great Britain (the majority will remain in the affected areas, or migrate to countries other than Great Britain). Whether they may bring H5N1 HPAI is clearly unknown, however, at this stage we consider that the likelihood of the potential introduction of the virus by wild birds has increased.

This risk assessment also acknowledges that conclusions are based on much uncertainty. Further developments are likely and these conclusions will continue to be subject to scrutiny when more structured epidemiological information becomes available in the future. Defra continues to monitor developments and re-assess the situation.

5 Acknowledgements

Defra would like to thank the members of the National Emergency Epidemiology Group's Ornithological Experts Panel (OEP) and the Veterinary Laboratories Agency (VLA) for their help preparing this Qualitative Risk Assessment. The OEP consists of representatives from the following organisations (in alphabetical order): British Trust for Ornithology (BTO), Royal Society for the Protection of Birds (RSPB), Scottish Executive (SE), Scottish Natural Heritage (SNH), UK Joint Nature Conservation Committee (JNCC) and Wildfowl & Wetlands Trust (WWT).

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