EURING

The European Union for Bird Ringing

Report to the European Commission

Urgent preliminary assessment of ornithological data relevant to the spread of Avian Influenza in Europe

STUDY CONTRACT N°07010401/2005/425926/MAR/B4

Authors

Philip W Atkinson, Jacquie A Clark, Simon Delany, Cheikh Hamalla Diagana, Chris du Feu, Wolfgang Fiedler, Thord Fransson, Michel Gaulthier-Clerc, Mark Grantham, Marion Gschweng, Ward Hagemeijer, Toon Helmink, Alan Johnson, Sergey Khomenko, Georgios Martakis, Otto Overdijk, Robert A. Robinson, Alexander Solokha, Fernando Spina, Seydina Issa Sylla, Jan Veen, Dick Visser

Edited by

Simon Delany, Jan Veen and Jacquie Clark

Editorial assistant

Susanne Boom

May 2006

Contents

Executive Summary

In the course of 2005 the highly pathogenic Avian Influenza Asian lineage HPAI H5N1 virus spread from Southeast Asia to SW Siberia, Kazakhstan and the Southern Urals. Migratory birds were suspected of playing a role in the spread of the disease. This meant that the EU could be under direct threat as a number of waterbirds (geese, ducks and shorebirds in particular) were known to migrate through the infected areas to the EU in winter. The European Commission (DG Environment) therefore asked Wetlands International and EURING to undertake the present study. The aims of the project were: (1) to identify species which pose a relatively high risk of spreading H5N1 along their migration routes to the European Union, (2) to analyse the migration routes of these so-called Higher Risk Species on the basis of recoveries of ringed birds, (3) to identify wetland sites where Higher Risk Species concentrate in large numbers during migration and wintering and (4) to develop and test a format for the rapid assessment of ornithological data at the level of wetland sites, in order to prepare wetland managers for an outbreak of H5N1.

Identification of Higher Risk Species
The identification of Higher Risk Species focused on the Anseriformes (swans, geese and ducks) and the Charadriiformes (shorebirds, gulls and terns), because these groups are known to frequently carry Avian Influenza viruses. We first selected all species of both groups which occur in Europe and which are migratory. Then each species was characterized on the basis of behavioural and ecological characteristics which are assumed to be related to the chance of becoming infected with H5N1 outside the EU. The characteristics chosen were *habitat use, gregariousness* and *degree of mixing with other species*. Species were selected which occurred in agricultural and/or freshwater habitats, which were highly gregarious and which showed a high degree of mixing, which led to a list of 26 Higher Risk Species being identified (Table 1.1). *Contact risk with poultry* was also estimated, resulting in the highest scores for Mallard *Anas platyrhynchos* and Black-headed Gull *Larus ridibundus* (Table 1.3).

In the discussion, "risk factors" are summarized for all Higher Risk Species (Table 1.6). It is concluded that 13 of the 26 Higher Risk Species (50%) have been confirmed to be infected with H5N1 (usually victims near outbreaks in poultry) against 8 out of 84 (9.5%) of the non-selected species. This suggests that our selection has indeed identified migratory bird species with a relatively high susceptibility to H5N1.

Concentrations and movements of Waterbirds with potential to spread Avian Influenza
Waterbird count data from the Wetlands International IWC (International Waterbird Census) database in Europe, Africa, West and Central Asia were analysed in detail, together with data relating to birds ringed or found dead (recovered) in Europe and held in the EURING databank. Numbers of 17 selected Higher Risk species in each EU Member State during the breeding season and in January were also compiled and presented. These data were supplemented by literature reviews. Detailed summaries of sites holding important numbers of the 17 Higher Risk species are presented in maps and

Tables, and movements are summarised by means of monthly ring recovery maps, generalised maps of migration patterns and migration synopsis Tables. Within Europe, regions with particularly high concentrations of sites important for waterbirds in January are the Black Sea-East Mediterranean region, the West Baltic and Southern North Sea regions, and lakes north of the Alps. The West Mediterranean region is also important, but key sites are more widely dispersed. Waterbird diversity is generally highest in Eastern and Southern Europe, but sites with high numbers are found throughout the continent except in mountainous regions and those that are frozen in January. There are two large regions outside Europe but within the flyways of many of the 17 selected Higher Risk species where very high numbers of waterbirds have been recorded: the southern Caspian (particularly Azerbaijan) and western Iran, and the Sahel zone of West Africa. Most of the Higher Risk species selected are broad front migrants which migrate in westerly and southerly directions in autumn, and north and east in spring. April is the month when most of these species move furthest on their spring migration. Autumn migration is usually more protracted, beginning as early as July in some species, and continuing until November for others. A number of key staging sites have been identified in western Russia and Kazakhstan, but more information is needed on sites used during migration.

Rapid assessment format for ornithological data in case of an outbreak of H5N1
Outbreaks of H5N1 among wild birds often occur unexpectedly, confronting site managers with an emergency situation, which demands quick action. Managers, together with local and national authorities will have to take decisions with respect to restricting human use of a site, monitoring bird mortality and sampling for virus prevalence.

In order to give guidance to site owners and site managers to be prepared for an outbreak of H5N1 in their wetland area, a format was developed for presenting ornithologcal information (Annex 3.1). Its main purpose is to guide and stimulate site managers to seriously consider possible future events, to prepare for an outbreak of HPAI, and to develop a strategy in anticipation of the possible spread of the disease to their site.

The format developed includes:

- The nature of occurrence of vulnerable bird species
- Places with high concentrations of vulnerable bird species within the site
- Local movements of vulnerable bird species to neighbouring sites
- Position of site in flyway and consequences of bird movements for further spread of H5N1
- Human use of the site and its disturbance effects
- The existence of poultry farms within a radius of 10 km of the site
- Measures to be considered in case of an outbreak

After the assessment format had been developed and guidelines for its use added, it was tested for four sites:

- National Park Schiermonnikoog (Island in the north of the Netherlands)

- The Camargue (delta of the river Rhône in the south of France)
- Djoudj National Park (part of the delta of the Senegal river in the north of Senegal)
- Eastern Sivash (lagoons and lakes bordering the Sea of Azov, Crimea, Ukraine)

The assessments showed that a lot of information can be made available in a short period of time. In reaction to the many questions posed in the format, site managers came up with a large number of useful ideas. Of special interest was an analysis carried out in the Sivash, aiming at identifying areas with different degrees of outbreak risk, based on three factors: (1) the distribution of waterbird concentrations, (2) the distribution of human habitation as a determinant of poultry density and (3) the distribution of small scale waterways where wild birds and poultry can easily mix.

Acknowledgements

The waterbird count data which are the basis of the IWC database have been collected over many decades by a large network of expert waterbird counters, most of whom are volunteers. In Europe, at least 11,000 of these observers go out every year when the weather is at its worst to count waterbirds as a contribution to their conservation. We salute their expertise, enthusiasm and skill. We also thank over 100 National Coordinators of waterbird monitoring schemes, without whom the IWC programme could not function. Special thanks to Marc van Roomen, Johannes Wahl and Erik van Winden who prepared summaries of national data at very short notice especially for this report.

We would also like to thank all the EURING schemes who work so hard to collect and computerise the ring recovery data on which much of this report is based. We are particularly grateful that so many schemes were able to send updated files of recoveries to the EDB to allow this report to include the most recent information. The greatest contribution to the collection of recovery data has been made by the thousands of bird ringers, throughout Europe and elsewhere, who give their time to catch and ring wild birds. Without these volunteers, work on this scale would be impossible. We would also like to thank the many members of the public who have found and reported birds to the ringing schemes. Again their contribution is invaluable.

Thanks also to Rowena Langston, Arie Spaans, David Stroud and to members of The European Commission ORNIS Scientific Working Group for contributions to Chapter 1. We thank Jane Waters for editorial assistance, and Humphrey Crick and Nanny Heidema for comments and expertise.

Thanks are also due to the British Trust for Ornithology who kindly house the EDB currently. The EDB was formerly housed by the Netherlands Institute for Ecology (NIOO-KNAW); EURING are very grateful for their long-term support and Rinse Wassenaar, formerly the EDB manager, has contributed a tremendous amount to the EDB over many years. We would also like to thank the Board of EURING and the other EURING members who have encouraged us to carry out this work.

Wetlands International's waterbird monitoring programme has received funding and other support in recent years from the Joint Nature Conservation Committee (UK), Ministry of Agriculture, Nature Management and Food Security (The Netherlands), Alterra Green World Research (The Netherlands), The National Environment Research Institute (Denmark) and the Swiss Agency for the Environment, Forests and Landscape.

Finally, grateful thanks are due to Michéal O'Briain at the European Commission DG Environment, for good-humoured and patient cooperation.

Introduction

During 2005, the H5N1 strain of Highly Pathogenic Avian Influenza (HPAI) spread north, then west from countries in east and southeast Asia that had been affected by the disease since 1997. Factors causing the spread of HPAI include methods used in the farming and transport of domestic poultry and poultry products, trade (legal and illegal) in wild and domestic birds, and probably transfer between domestic birds and wild migratory birds, especially a number of waterbird species. Knowledge of this disease, although growing fast, is still limited and the relative importance of these factors is still disputed, but there now seems little doubt that wild birds are capable of carrying the disease and passing it on to other birds (Olsen et al. 2006).

As the disease spread, the serious consequences to public health, economic and ecological interests gave HPAI a very high priority among national and international decision makers. Outbreaks of the disease in west Asia, Africa and Europe were predicted, and in late 2005 the European Commission initiated epidemiological, virological and ornithological studies to find out about the occurrence and behaviour of the disease in wild birds, and about the numbers, distribution and movements of wild bird species which might pose a risk in its spread. This report is a summary and analysis of a large volume of ornithological data collected over a number of decades by Wetlands International (waterbird numbers and key sites) and EURING, the European Union for Bird Ringing (waterbird movements). Data and information on bird numbers and movements in Europe, southwest and central Asia, and Africa have been compiled and analysed with the aim of assessing the risk at continental, national and site level of HPAI spreading through the flyways of the birds that use these landscapes for breeding, moulting, staging and "wintering".

The report begins by identifying a suite of species which present a high risk of spreading HPAI in Europe. This is followed by detailed analysis of numbers, distribution, key sites and movements of 17 of these species. Work then focuses on four study sites used by large numbers of these birds, which were used to develop an approach for rapid analysis of relevant data at a site in the event of an outbreak of HPAI. Finally, the report identifies gaps in information and proposes analyses that should be undertaken in continuation of this work.

1. Identification of Higher Risk Species

1.1. Introduction

There is a wealth of information showing that Low Pathogenic Avian Influenza (LPAI) viruses are widespread among wild birds, with a relatively high prevalence among waterbirds, especially ducks. It is generally assumed that wild birds are the natural reservoir for LPAI viruses which may occasionally infect free-range poultry in situations where both make use of the same habitats. Galliform birds, such as chickens and turkeys are especially vulnerable to AI viruses. Moreover, they are often kept in large numbers and at high densities. Both these factors contribute greatly to the rate of virus replication which, through mutation, may give rise to Highly Pathogenic Avian Influenza (HPAI) strains. Wild birds may subsequently be infected with HPAI through contact with poultry. The spread of HPAI from one area to another may result from movements of infected poultry or poultry products as well as from movements by infected wild birds.

The outbreak of Asian lineage HPAI H5N1 which started in Hong Kong in 1997 first spread into South East Asia and China, and subsequently, in 2005, westwards to Central and Southwest Asia, and in 2006 to Europe, Africa and the Indian Sub-continent. The way the virus spread has been the subject of much speculation. In a number of cases there was clear proof that transport of poultry, poultry products or trade of infected pet birds played a role. For a long period of time there was no proof of a role played by wild birds. Nevertheless, there was a strong tendency to blame migratory wild birds, which was especially apparent in the mass media. The recent spread of H5N1 over Europe has clearly shown that wild birds do play a role in spreading H5N1: By the end of April 2006 there were outbreaks among wild birds in 13 European countries, whereas outbreaks also occurred in poultry in only 3 of these countries.

Although wild birds play a role in the spread of H5N1, it should be stressed that any detailed knowledge of the way in which this takes place is lacking. Despite the enormous increase in interest of the scientific world in the mechanisms of spread of the H5N1 virus, we still know very little about:

- The conditions under which H5N1 is transmitted between wild birds, either directly through close contact, or indirectly through the environment;
- The length of incubation periods, course of the disease and virus shedding periods in wild birds;
- Symptoms and mortality rates shown by diseased wild birds;
- Changes in behaviour of moribund birds, especially with respect to mobility and the likelihood of carrying the virus over large distances;
- Whether wild birds may spread H5N1 mechanically, for instance by carrying faeces on feathers and feet;
- Whether wild birds may carry H5N1 asymptomatically and transmit it to other birds.

The likelihood that a migratory wild bird species could introduce H5N1 into the EU and that poultry could subsequently be infected requires the following conditions to be fulfilled:

- The species visits an outbreak area.
- The species comes into contact with infected poultry and gets infected with H5N1, or it comes into contact with infected material (faeces) which it then carries mechanically.
- Infected individuals of the species are capable of migrating to within EU borders, either being ill, or carrying the virus asymptomatically. Alternatively, infected birds may transmit the virus to conspecific or heterospecific wild birds which may then carry it to the EU.
- Within EU borders the species comes into contact with poultry. Alternatively, it comes into contact with and infects other wild birds which function as "bridge species" with respect to transmission of the disease to poultry.

Although we know very little about the mechanisms of spread of H5N1 in wild birds, the above conditions can be related to a species' behaviour and ecology. For instance, migratory behaviour determines the chances of a species passing through outbreak areas as well as the time spent in such areas. Habitat use can be expected to be largely responsible for the chances that a species comes into contact with (free-range) poultry. Behaviour patterns, such as the tendency to occur in large and dense groups and to mix with other species can be expected to contribute to the likelihood that the virus is transmitted from one bird to another. Once H5N1 has been introduced within EU borders, behaviour such as the likelihood of occurrence near human settlements and of coming into contact with poultry can be expected to be an important determinant for the infection of poultry. Finally, the number of individuals present within a particular country or area will contribute to the risk posed by "the species".

This chapter deals with the identification of "higher risk species", based on an analysis of patterns of behaviour and ecology referred to above. The focus is on the introduction of H5N1 to the European Union. Therefore, higher risk species are defined as *bird species which pose a relatively high risk (as compared to other birds) of spreading Highly Pathogenic Avian Influenza (HPAI H5N1) along their migration routes from outbreak sites outside the European Union to within EU borders.*

1.2. Selection of Anseriformes and Charadriiformes for analysis

Altogether, some 500 bird species occur within the European Union, a large proportion of them being migratory. As it was not feasible to analyse the behaviour and ecology of so many species, a pre-selection had to be made. This was done on the basis of data on the occurrence of Avian Influenza viruses in different taxonomic groups of birds.

In a large number of countries in all parts of the world, wild birds have recently been analysed for the occurrence of Avian Influenza viruses. Data are available now for some hundreds of different species. The proportion of individuals being infected with one or

more AI strains appears to vary with geographic location and with season, but differences between species appear to be most prominent. Relatively high proportions of infected birds have been found for the taxonomic groups of the Anseriformes (swans, geese and ducks) and the Charadriiformes (waders, gulls, terns and auks) whereas far lower proportions (often equal or near to zero) have been found for nearly all other taxonomic groups (Kaleta et al. 1985, Webster et al. 1992, Alexander 2000,). The above mainly refers to Low Pathogenic Avian Influenza viruses (LPAI). Data on the occurrence of HPAI strains in wild bird populations are extremely scarce. This also applies to H5N1, which has only been found in a few cases and in extremely small numbers in virtually healthy wild birds (e.g. Tree Sparrow, Kou et al. 2005). However, victims of H5N1 (usually birds found dead) have been recorded in most areas where outbreaks of H5N1 have occurred. Many of these victims appeared to belong to the Anseriformes and Charadriiformes as well (for updated overviews see USGS 2006).

Considering the above, we conclude that there is a clear prevalence of Avian Influenza viruses in the Anseriformes and Charadriiformes. This has led to the decision to consider for the present analysis all species belonging to the Anseriformes and the Charadriiformes, which occur in Europe and which are migratory in the sense that (a substantial part of) the population migrates from outside the EU to within EU borders. Altogether 110 species were listed in a spreadsheet after which behavioural and ecological characteristics were noted as will be outlined below. The full spreadsheet is given as Annex 1.1

1.3. Selection of higher risk species on the basis of behaviour and ecology

Migratory wild birds being infected with H5N1 outside the European Union might introduce the disease within EU borders in a direct as well as an indirect way. In the first case it is assumed that the infected bird itself migrates to the EU, whereas the second possibility implies that other birds are infected along the migration route, which then bridge the gap to the EU. In this respect the following behavioural and ecological factors are considered important determinants for the acquisition and transmission of the HPAI virus:
- habitat use during migration/wintering
- gregariousness during migration/wintering
- degree of mixing with other species during migration/wintering

1.3.1. Main habitat during migration and wintering

Habitat is assumed to be of importance with respect to the chances of a species becoming infected with the H5N1 virus outside the EU. There is currently little evidence to support this assumption, although it is reasonable to assume that a species occurring solely at sea or in the forest canopy poses considerably less risk of coming into contact with poultry (and becoming infected) than a species that uses agricultural habitats also frequented by free-range poultry.

Habitat use is also assumed to influence the chances for wild bird to wild bird transmission. Apart from the possibility that the virus is transmitted through direct contact or through the air, birds may also be indirectly infected through the environment. Since Avian Influenza viruses appear to survive better in water than on land, and fresh water gives better survival rates than salt water (Stallknecht pers. com.), it can be expected that indirect infection takes place relatively easily in fresh water habitats.
For each species, habitat use has been indicated using the following coding:

A	=	agricultural land
N	=	natural land habitat (usually marshes near wetlands; this coding has especially been used to distinguish purely freshwater species, which rarely come ashore (F), from those which also use non-agricultural land habitat (FN))
O	=	other land habitat (variety of habitat types, including woodland and urban areas)
F	=	fresh water
M	=	marine
L	=	littoral

Where more than one habitat is used, multiple coding has been applied. Note that the sequence of habitat code elements indicates relative use of the different habitats. Thus the code MF indicates that the species primarily occurs in marine areas but also can use freshwater habitats, whilst FM would indicate the converse.

The various codes used are as follows: AN, AL, F, FA, FAL, FAN, FL, FLN, FM, FN, L, LA, LF, LFA, LFN, M, MA, MF, ML, O.

1.3.2. Gregariousness during migration/wintering periods

Little information is available showing a relationship between gregariousness and the chances of Avian Influenza viruses being transmitted between birds (but see Deibel et al. 1985). Expert opinion and basic epidemiological principles suggest that species which are highly gregarious are more likely to become infected with H5N1 since close contact between birds may result in the virus being more readily passed from bird to bird within flocks. Two components of gregariousness can be assessed, group size and group density. Gregariousness has been indicated by two letters, which denote group size and group density, respectively. The following coding has been applied:

Group size

L	=	Large: often several hundreds to thousands of individuals (Eurasian Wigeon *Anas penelope*)
M	=	Medium: often several tens to few hundred individuals (Whooper Swan *Cygnus cygnus*)
S	=	Small: often up to a few tens of birds (Purple Sandpiper *Calidris maritima*)
O	=	Usually solitary or a few birds together (Green Sandpiper *Tringa*

ochropus)

Density

H = High density: often less than 2 m between individuals (Dunlin *Calidris alpina*)

M = Medium density: often 2-5 m between individuals (Herring Gull *Larus argentatus*)

L = Low density: often more than 5 m between individuals (Common Snipe *Gallinago gallinago*)

O = (near) solitary (Great Skua *Stercorarius skua*)

1.3.3. Degree of mixing during migration/wintering periods

Species which readily mix with other species of waterbirds are thought to be more likely to become infected with H5N1, since contact between species may result in transmission of the viral infection. Likewise, it is assumed that species which do not come into close contact with other species are at lower risk of infection. The mechanisms of spread between species are assumed to be largely similar to those between individuals within flocks of the same species. As with gregariousness, there is currently no evidence to support these assumptions.

Degree of mixing with other species (mixed foraging, mixed roosts, mixing at moulting areas, etc.) has been indicated as follows:

H = High degree (Eurasian Wigeon *Anas penelope*)

M = Medium degree (Northern Lapwing *Vanellus vanellus*)

L = Low degree (Temminck's Stint *Calidris temminckii*)

O = Hardly any mixing (Common Sandpiper *Actitis hypoleucos*)

1.3.4. Analysis

Taxa were analysed at the species level with one exception: the Greenland race of the Greater White-fronted Goose *Anser albifrons flavirostris* was evaluated separately on the basis of significantly smaller group sizes and lower degree of mixing compared to the nominate race *A.a. albifrons* which largely occurs on continental Europe.

Higher risk species

Referring to the above, species which prefer agricultural fields and freshwater habitats, which are gregarious and have a high degree of mixing with other species, should be regarded to pose the highest risk of spreading H5N1 from outside the EU to within EU borders. In evaluating such species, a number of steps were taken.

Species were not selected if:

- They occurred mainly in marine (M), littoral (L), environments or other habitats (O) (i.e. species whose habitat use codes begin with O, L or M since such species are expected to only occasionally use freshwater and agricultural habitats, and/or

- They showed hardly any, or a low gregariousness (i.e. codes denoting small group size (O and S) in combination with low and medium density (L and M). In Annex 1.1 these are the codes OO, OL, OM, SL, and SM), and/or

- They showed least mixing with other species (showing either hardly any mixing (O) or a low degree of mixing (L)).

The resultant selection of higher risk species on the basis of habitat use, gregariousness and degree of mixing is given in Table 1.1. It consists of 2 swan, 8 goose, 10 duck, 4 shorebird and 2 gull species (total 26 species).

Table 1.1: Higher risk species as selected on the basis of habitat use, gregariousness and degree of mixing with other species.

English name	Scientific name	Habitat	Greg.	Mixing
Bewick's Swan	*Cygnus columbianus*	FA	ML	M
Mute Swan	*Cygnus olor*	FA	ML	M
Pink-footed Goose	*Anser brachyrhynchus*	FA	LH	M
Bean Goose	*Anser fabalis*	FA	LM	H
Greater White-fronted Goose*	*Anser albifrons albifrons*	FA	LH	H
Lesser White-fronted Goose	*Anser erythropus*	FA	LH	M
Greylag Goose	*Anser anser*	FA	LH	H
Barnacle Goose	*Branta leucopsis*	FAL	LH	H
Brent Goose	*Branta bernicla*	FAL	LH	M
Red-breasted Goose	*Branta ruficollis*	AL	MH	H
Eurasian Wigeon	*Anas penelope*	FAL	LH	H
Common Teal	*Anas crecca*	FAL	MH	H
Mallard	*Anas platyrhynchos*	FAL	MH	H
Northern Pintail	*Anas acuta*	FAL	MH	H
Garganey	*Anas querquedula*	F	?	H
Northern Shoveler	*Anas clypeata*	FL	MH	H
Marbled Teal	*Marmaronetta angustirostris*	F	MM	H
Red-crested Pochard	*Netta rufina*	F	MM	?
Common Pochard	*Aythya ferina*	F	MH	H
Tufted Duck	*Aythya fuligula*	F	MH	H
Northern Lapwing	*Vanellus vanellus*	FA	MH	M
Eurasian Golden Plover	*Pluvialis apricaria*	AN	LH	M
Black-tailed Godwit	*Limosa limosa*	FAL	MM	H
Ruff	*Philomachus pugnax*	FA	MM	M
Black-headed Gull	*Larus ridibundus*	FAL	LM	H
Common Gull	*Larus canus*	FAL	MM	H

1.4 Higher risk species in relation to the source of an outbreak

The higher risk species selected above can be expected to pose a risk only if they pass through outbreak areas where they can potentially be infected with H5N1. At the time this project was developed, the nearest outbreak areas occurred around the Black and Aegean Seas and in the Southern Urals. This has led to an analysis of migratory behaviour focussing on these two areas.

For each species included in the analysis (see Annex 1) the following questions were asked:

- Does the species have a well-defined migratory flyway?
- Is there a potential direct migratory linkage between the Black or Aegean Seas and the EU?
- Is there a potential direct migratory linkage between the Southern Urals and the EU?

No attempt has been made to analyse the migration behaviour in relation to other (potential) outbreak areas. An exception has been made for higher risk species migrating through Nigeria, just to show that different sub-sets of the list of higher risk species should be considered depending on geographic location of outbreak areas (see Table 1.2).

Table 1.2: Higher risk species (indicated by crosses) migrating to the European Union from the Black & Aegean Seas, the Southern Urals and from Nigeria

English name	Scientific name	Black & Aegean Seas	Southern Urals	Nigeria
Bewick's Swan	*Cygnus columbianus*			
Mute Swan	*Cygnus olor*	X	?	
Pink-footed Goose	*Anser brachyrhnchus*			
Bean Goose	*Anser fabalis*			
Greater White-fronted Goose	*Anser albifrons albifrons*	X	X	
Lesser White-fronted Goose	*Anser erythropus*			
Greylag Goose	*Anser anser*	X		
Barnacle Goose	*Branta leucopsis*			
Brent Goose	*Branta bernicla*			
Red-breasted Goose	*Branta ruficollis*	X	X	
Eurasian Wigeon	*Anas penelope*	X	X	X
Common Teal	*Anas crecca*	X	X?	X
Mallard	*Anas platyrhynchos*	X		
Northern Pintail	*Anas acuta*	X	X?	X
Garganey	*Anas querquedula*		X	X
Northern Shoveler	*Anas clypeata*	X?	X	X
Marbled Teal	*Marmaronetta angustirostris*			
Red-crested Pochard	*Netta rufina*	X		
Common Pochard	*Aythya ferina*	X	X	
Tufted Duck	*Aythya fuligula*	X	X	
Northern Lapwing	*Vanellus vanellus*	X?	X	
Eurasian Golden plover	*Pluvialis apricaria*			
Black-tailed Godwit	*Limosa limosa*			X
Ruff	*Philomachus pugnax*			X
Black-headed Gull	*Larus ridibundus*	X?		X
Common Gull	*Larus canus*			

1.5 Higher risk species and contact risk with poultry within the EU

All higher risk species identified migrate to the EU in large numbers, many of them staying within EU borders for most of the winter. It has been argued that habitat use, gregariousness and degree of mixing can be expected to play a major role in the chances of a species getting infected with H5N1 along its migration route and subsequently introducing it into EU countries. The same aspects of behaviour and ecology can be expected to play an important role in further spreading the virus within Europe, between wild birds as well as back to poultry.

Although contact risk with poultry is regarded as being at least partly incorporated into the factor habitat use, it was felt necessary to study this factor in more detail for the European situation. On the basis of knowledge of the behaviour of waterbirds, the likelihood of close contact between the species listed in Table 1.1 and domesticated/captive poultry has been assessed as:

H = High contact risk
M = Medium contact risk
L = Low contact risk
O = Virtually no contact risk

This assessment has considered risk as a function of contact intensity. Thus a scenario where small numbers of wild birds are potentially in contact with poultry for a long period is considered equivalent to a scenario where larger numbers are in contact for a shorter period. Independent assessments of risk were sought from the members of the Scientific Working Group of the EC Birds Directive's Ornis Committee. Data were obtained from the representatives of the United Kingdom, Ireland, Portugal, Czech Republic, Slovenia, Austria, Germany, The Netherlands and Estonia who all provided data, based on expert judgement, for the situation in their own country. Mean scores calculated are given in Table 1.3. (The Table includes only the data for the HRS species; for other species see Annex 1.1)

Table 1.3: Indication of contact risk with poultry for higher risk species based on data obtained from nine EU member states (results of a questionnaire presented to the Scientific Working Group of the EC Bird Directive's Ornis Committee). Contact risk is given as: H = high, M = medium, L = low, O = virtually impossible.

English name	Scientific name	Contact risk
Bewick's Swan	*Cygnus columbianus*	L
Mute Swan	*Cygnus olor*	M
Pink-footed Goose	*Anser brachyrhynchus*	L
Bean Goose	*Anser fabalis*	L
Greater White-fronted Goose	*Anser albifrons albifrons*	M
Lesser White-fronted Goose	*Anser erythropus*	O
Greylag Goose	*Anser anser*	M
Barnacle Goose	*Branta leucopsis*	L
Brent Goose	*Branta bernicla*	L
Red-breasted Goose	*Branta ruficollis*	L

Eurasian Wigeon	*Anas penelope*	M
Common Teal	*Anas crecca*	M
Mallard	*Anas platyrhynchos*	H
Northern Pintail	*Anas acuta*	L
Garganey	*Anas querquedula*	L
Northern Shoveler	*Anas clypeata*	L
Marbled Teal	*Marmaronetta angustirostris*	O
Red-crested Pochard	*Netta rufina*	L
Common Pochard	*Aythya ferina*	L
Tufted Duck	*Aythya fuligula*	L
Northern Lapwing	*Vanellus vanellus*	M
Eurasian Golden Plover	*Pluvialis apricaria*	L
Black-tailed Godwit	*Limosa limosa*	L
Ruff	*Philomachus pugnax*	L
Black-headed Gull	*Larus ridibundus*	H
Common Gull	*Larus canus*	L

Contact risk with poultry through bridge-species

Contact between wild birds and domestic poultry is likely to be restricted to species, not exclusively waterbirds, that associate with man, for instance by looking for food provided for poultry or simply by being associated with farmland. Birds that live in close proximity to domestic poultry can be considered as "bridge species" in having the potential to transmit H5N1 from wild waterbirds, higher risk species in particular, to poultry. Representatives of a large number of taxonomic groups might act as bridge species in the European situation, a tentative list of the most likely species being given in Table 1.4. It should be noted that bridge species have not been subject of this study. The list should therefore be treated with caution. It has been compiled to serve as an example for the *rapid assessment of ornithological data for wetlands sites in case of an outbreak of H5N1* as described in Chapter 3.

Table 1.4: Tentative list of European bird species that live in proximity to domestic poultry and which might act as "bridge species" for the transmission of H5N1 between waterbirds and poultry.

English name	Latin name	Risk
Great Cormorant	*Phalacrocorax carbo*	medium
Cattle Egret	*Bubulcus ibis*	high
Grey Heron	*Ardea cinerea*	medium
Ring-necked Pheasant	*Phasianus colchicus*	high
Common Coot	*Fulica atra*	medium
Common Moorhen	*Gallinula chloropus*	medium
Wood Pigeon	*Columba palumbus*	high
Collared Dove	*Streptopelia decaocto*	high
Black-billed Magpie	*Pica pica*	high
Eurasian Jackdaw	*Corvus monedula*	high
Rook	*Corvus frugilegus*	medium
Carrion Crow	*Corvus corone*	medium
European Starling	*Sturnus vulgaris*	high
House Sparrow	*Passer domesticus*	high
Eurasian Tree Sparrow	*Passer montanus*	high

1.6 Abundance of higher risk species within the EU

The threat posed by a particular bird species with respect to the risk of introducing and spreading H5N1 in the EU (and similarly in each individual country) can be expected to be related to the number of individuals of that species entering the EU and the length of its stay. Table 1.5 gives the size of the non-breeding biogeographic populations established for populations within boundaries which include Europe (data according to Wetlands International 2002). It shows marked differences, with numbers varying between 8,000-10,000 (Lesser White-fronted Goose) and 6,900,000-9,000,000 (Black-headed Gull) individuals. Breeding and wintering populations for the different member states are given in Tables 2.2 and 2.5 in the next chapter.

Table 1.5: Size of the non-breeding bio-geographiocal populations (individuals) of 26 higher risk species occurring within the European Union (data according to Wetlands International 2002)

Common name	Scientific name	Estimates of biogeographic populations which include Europe
Bewick's Swan	*Cygnus columbianus*	29,000
Mute Swan	*Cygnus olor*	297,500
Pink-footed Goose	*Anser brachyrhnchus*	277,000
Bean Goose	*Anser fabalis*	700,000
Greater White-fronted Goose	*Anser albifrons albifrons*	1,000,000
Lesser White-fronted Goose	*Anser erythropus*	8,000-10,000
Greylag Goose	*Anser anser*	522,100
Barnacle Goose	*Branta leucopsis*	437,100
Brent Goose	*Branta bernicla*	240,000
Red-breasted Goose	*Branta ruficollis*	88,000
Eurasian Wigeon	*Anas penelope*	1,800,000
Common Teal	*Anas crecca*	1,150.000-1,775,000
Mallard	*Anas platyrhynchos*	7,500,000
Northern Pintail	*Anas acuta*	1,060,000
Garganey	*Anas querquedula*	2,000,000-3,000,000
Northern Shoveler	*Anas clypeata*	490,000
Marbled Teal	*Marmaronetta angustirostris*	3,000-5,000
Red-crested Pochard	*Netta rufina*	70.000-93.500
Common Pochard	*Aythya ferina*	1,450,000
Tufted Duck	*Aythya fuligula*	1,900,000
Northern Lapwing	*Vanellus vanellus*	2,800,000-4,000,000
Eurasian Golden Plover	*Pluvialis apricaria*	1,644,000-1,953,000
Black-tailed Godwit	*Limosa limosa*	267,000-391,000
Ruff	*Philomachus pugnax*	>1,000,000
Black-headed Gull	*Larus ridibundus*	6,900,000-9,000,000
Common Gull	*Larus canus*	1,400,000-3,100,000

1.7 Discussion

In the preceding sections, an analysis was made of the relative risk posed by migratory wild bird species belonging to the taxonomic groups of the Anseriformes and Charadriiformes of introducing and subsequently spreading H5N1 within Europe. A list

of 26 higher risk species was identified on the basis of aspects of behaviour and ecology which are assumed to determine, at least to a large extent, the chances of becoming infected with H5N1 outside EU borders. The assessment of behaviour and ecology has largely been done on the basis of expert judgement and the question arises whether there is any indication that our selection indeed represents species which are more likely to carry H5N1 than others? It has been mentioned before that the number of cases in which H5N1 has been found in apparently healthy birds is extremely small. However, there is an ever increasing number of birds found dead in areas with outbreaks of H5N1 for which infection with the virus has been confirmed. Such victims, apart from two cases all found dead, can be regarded as representing species which have a relatively high chance of coming into contact with infected poultry. Considering the list of H5N1 infected species (data available up to 30 March) it appears that 13 out of 26 (50.0%) higher risk species have been found against 8 out of 84 (9.5%) of the non-selected species. This large difference in H5N1 prevalence leads us to conclude that the higher risk species are indeed more likely to be infected with H5N1 than the non-selected species.

Table 1.6 gives an overview of the various risk factors considered. Within each column relative risk is expressed by a number of crosses. It appears that differences with respect to behaviour and ecology are relatively small (species were all selected because of their high scores!) but there are major differences for contact risk with poultry (from zero to XXX) and species abundance (X to XXXXXXXX). Mallard and Black-headed Gull show high scores for all risk factors.

The risk factors included in Table 1.6 can all be expected to play a role in the spread of H5N1 once it is introduced within EU borders. However, the various factors do not simply add up as they are interrelated in several ways. For instance, habitat use is assumed to influence contact risk with poultry, whereas gregariousness can be expected to show some relation to population size (numbers in Table).

The identification of higher risk species and the attribution of risk factors as given in Table 1.6 refers to the EU as a whole. There are, undoubtedly, marked differences between EU member states and, even more pronounced, at the level of wetland sites. As a consequence, the data presented here should always be “translated” to the local situation. First of all, higher risk species are not evenly distributed over the EU member states. For instance, 80% of all wintering Greater White-fronted Geese winter in the Netherlands and Germany, more than 90% of all Red-breasted Geese winter in Bulgaria, Romania and Greece, whereas nearly all European wintering Marbled Teal concentrate in Spain. Contact risk with poultry is also a factor to be considered with great caution and to be looked at at a national or local scale. First of all, the mean scores provided for this factor are based on data available for only 9 EU member states. Moreover, it should be noted that on many occasions contact risk assessed for a particular species was markedly different between countries. Such differences might be related to a variety of factors such as local differences in poultry keeping methods and factors such as food availability and disturbance. Chapter 3 gives some more information about how ornithological data could be analysed and used in order to be prepared for outbreaks of H5N1 at a local scale.

Table 1.6: Overview of risk factors for higher risk species with species confirmed to be found infected with H5N1 indicated (right hand column). Risk is indicated with a number of crosses in the following ways: Ecology and behaviour (maximum score XXXX): one X has been given for F and A in habitat use, MM or higher in gregariousness and M or H in degree of mixing. Contact risk with poultry (maximum score XXX): L, M and H have been given X, XX and XXX, respectively. Numbers in EU (maximum score XXXXXXXX): each X stands for 1 million birds (rounded figures for wintering population) with the exception that one X also includes population sizes smaller than 500,000 (numbers refer to bio-geographical winter populations as used in Table 1.5). For information on the meaning of codes used, see Section 1.3.

English name	Scientific name	Risk factors			H5N1 confirmed
		Ecology & behaviour	Contact Risk with poultry	Numbers in EU	
Bewick's Swan	*Cygnus columbianus*	XXX	X	X	
Mute Swan	*Cygnus olor*	XXX	XX	X	X
Pink-footed Goose	*Anser brachyrhnchus*	XXXX	X	X	
Bean Goose	*Anser fabalis*	XXX	X	X	
Greater White-fronted Goose	*Anser albifrons albifrons*	XXXX	XX	X	X
Lesser White-fronted Goose	*Anser erythropus*	XXXX		X	
Greylag Goose	*Anser anser*	XXXX	XX	X	X
Barnacle Goose	*Branta leucopsis*	XXXX	X	X	X
Brent Goose	*Branta bernicla*	XXXX	X	X	
Red-breasted Goose	*Branta ruficollis*	XXX	X	X	X
Eurasian Wigeon	*Anas penelope*	XXXX	XX	XX	
Common Teal	*Anas crecca*	XXXX	XX	XX	X
Mallard	*Anas platyrhynchos*	XXXX	XXX	XXXXXXXX	X
Northern Pintail	*Anas acuta*	XXXX	X	X	X
Garganey	*Anas querquedula*	XXX	X	XXX	X
Northern Shoveler	*Anas clypeata*	XXX	X	X	X
Marbled Teal	*Marmaronetta angustirostris*	XXX		X	
Red-crested Pochard	*Netta rufina*	XX	X	X	
Common Pochard	*Aythya ferina*	XXX	X	X	X
Tufted Duck	*Aythya fuligula*	XXX	X	XX	X
Northern Lapwing	*Vanellus vanellus*	XXX	XX	XXX	
Eurasian Golden Plover	*Pluvialis apricaria*	XXX	X	XX	
Black-tailed Godwit	*Limosa limosa*	XXXX	X	X	
Ruff	*Philomachus pugnax*	XXXX	X	X	
Black-headed Gull	*Larus ridibundus*	XXX	XXX	XXXXXXXX	X
Common Gull	*Larus canus*	XXXX	X	XX	

The primary aim of our analysis was the identification of *species which pose a relatively high risk of spreading Highly Pathogenic Avian Influenza (HPAI H5N1) along their migration routes from outbreak sites outside the European Union to within EU borders.* We have restricted our analysis to the bird orders of the Anseriformes and Charadriiformes. This choice was based on the prevalence of Avian Influenza viruses in both groups. Moreover, nearly all representatives of these groups are waterbirds, most of which migrate over long distances. This made them highly appropriate for our study. However, it should be stressed that there are other species, migratory as well as sedentary, which might qualify for the status of higher risk species with respect to the

spread of Avian Influenza. Of special interest are waterbirds of the following families: Podicipedidae (grebes), Phalacrocoracidae (cormorants), Ardeidae (herons and egrets), Ciconiidae (storks), Threskiornithidae (ibises and spoonbills), Phoenicopteridae (flamingos) and Rallidae (coots). Besides, attention should be given to predators, scavengers and opportunistic feeders represented by the following families: Accipitridae (hawks, vultures and eagles), Falconidae (falcons), Corvidae (crows), Sturnidae (starlings) and Passeridae (sparrows).

2. Concentrations and movements of waterbirds with potential to spread Avian Influenza

2.1 Introduction

2.1.1 Waterbird numbers, distribution and key sites

The International Waterbird Census (IWC), Coordinated by Wetlands International and its predecessor organization, IWRB, was established in Europe and West Asia in 1967 and in Africa in 1990. Every year in January, over 20 million waterbirds are counted in the Western Palearctic, and up to 10 million in Subsaharan Africa by a network of about 14,000 largely voluntary waterbird counters (Gilissen et al. 2002, Dodman & Diagana 2003). The use of standardized methods and recording forms and modern computer software ensures that a continental-scale time series of data on waterbird numbers, distribution and population trends is available as the scientific basis of waterbird conservation (e.g. Wetlands International 2002, 2005 Delany et al. 2005). Counts are conducted in January because this is when many waterbird species congregate conspicuously at a relatively small number of sites where they can be readily counted. The January count is supplemented in Subsaharan Africa by a second annual count in July, and there are plans for additional counts throughout Europe, Africa and Asia, in March-April and September-October, to collect information from sites important during migration.

2.1.2 Interpretation of IWC data

More than 100 countries now participate in IWC around the world. The Census is coordinated at National Level by a wide variety of organisations and institutes and there are differences in approach which should be borne in mind when interpreting the resulting count data. The census is site-based, and defining sites in a standard way is problematic. Conservation policy uses criteria such as “sites that have held more then 20,000 waterbirds” or “sites that have held more than 1% of a waterbird population”, but criteria for defining sites are rather general and open to interpretation. In this report, many tables are presented which show sites where high numbers of waterbirds have been counted. It should be remembered when using these tables that site definition procedures are not totally objective. An example of this is the Inner Niger Delta in Mali, a wetland whose size varies according to flood conditions, but is, in some seasons, approaching the size of a small European country such as The Netherlands. For the purposes of the Census, this site has been divided into numerous quadrats, and data are presented on this basis, although treating the entire area as one very large “site” might be justified.

It should also be borne in mind that IWC totals are nearly always under-estimates of actual numbers of birds present in a site or a country. No country can cover 100% of suitable habitat, and site-based methods do not allow meaningful extrapolation. The IWC

totals are thus affected by levels of count coverage achieved at each site and in each country. Great efforts are made to standardise coverage from year to year, and most European countries now achieve high levels of coverage every year. Coverage in West Asia and Africa is less complete, but the most important sites in most countries have been covered between 1990 and 2005, the period covered by this report.

2.1.3 Final list of Higher Risk species for which detailed analyses were undertaken

For detailed analysis of numbers, distribution and movements 15 of the 25 "Higher Risk" species identified in Table 1.1 above were selected for analysis, plus two of the "near-selected" species also identified in Chapter 1.

The final list of species selected for these analyses is as follows:

Mute Swan	*Cygnus olor*
Greater White-fronted Goose	*Anser albifrons*
Greylag Goose	*Anser anser*
Red-breasted Goose	*Branta ruficollis*
Eurasian Wigeon	*Anas penelope*
Gadwall ("near-selected")	*Anas strepera*
Common Teal	*Anas crecca*
Mallard	*Anas platyrhynchos*
Northern Pintail	*Anas acuta*
Garganey	*Anas querquedula*
Northern Shoveler	*Anas clypeata*
Red-crested Pochard	*Netta rufina*
Common Pochard	*Aythya ferina*
Tufted Duck	*Aythya fuligula*
Northern Lapwing	*Vanellus vanellus*
Black-headed Gull	*Larus ridibundus*
Black Tern ("near-selected")	*Chlidonias niger*

It was agreed that with the time available for this "preliminary analysis" it would be possible to undertake detailed analyses of numbers, key sites and movements of about 15 species. Species from the final list of "Higher Risk" species identified above on the basis of their habitat use, gregariousness and degree of mixing were not included if data quality were considered to be relatively poor, or if the data were in a form which could not be readily analysed. The waterbird count data for geese are collected, stored and analysed separately from the rest of the International Waterbird Census database, and for this reason, only three of the geese were included. Similarly, the count data for most species of gull are incomplete and *Larus canus* was excluded for this reason. The geese included were the two most widespread in Europe (*Anser albifrons* and *Anser anser*) which make extensive use of farmland, plus a scarce species (*Branta ruficollis*) an individual of which

died of HPAI in Greece in 2005. *Cygnus columbianus* and *Marmaronetta angustirostris* were excluded because of their scarcity and their restricted distributions in Europe. Finally, waders (shorebirds) may be less susceptible to HPAI than Anseriformes, gulls and terns, and Eurasian Golden Plover, Ruff and Black-tailed Godwit were excluded for this reason, leaving one species, *Vanellus vanellus* to represent this group. Two species, Gadwall *Anas strepera* and Black Tern *Chlidonias niger* were included in detailed analyses although they only qualify as "near-selected" in the analysis undertaken in Chapter 1. Gadwall is the one widespread European dabbling duck otherwise excluded, and Black Tern has a more extensive non-breeding range in Africa than any other Higher Risk species.

2.1.4 The count data presented

The analyses presented in this report have been undertaken on behalf of the European Commission, specifically as an "urgent preliminary assessment". The best available data have been used to summarise numbers, distribution and movements of 17 species considered to present a High Risk of spreading Avian Influenza. The data presented for some species, particularly the geese, Northern Lapwing, and Black-headed Gull, were collected from a less standardised set of sites than those for other species, because of the particular way these species use the landscape (geese, which feed in fields by day and roost at wetlands at night), and because of differences in approach for different taxa in some countries (data for waders are submitted separately in The Netherlands, counting of gulls remains optional in some countries).

Waterbird count data presented in this chapter are thus biased towards counts made in the month of January, because of the implementation of IWC as the "midwinter census". Additional information on important breeding, moulting and staging sites in countries of the former Soviet Union has been extracted from the Russian literature (Table 2.1), but a comprehensive literature review of such sites in the rest of the region included in this report has been beyond the scope of contracted work.

Table 2.1: Publications in the Russian literature consulted to supplement data from the International Waterbird Census in analyses of important sites for waterbirds. The identification numbers in the table below are the same as those used in the tables of summarised count data to identify sources of information.

No.	Reference
1	Andreev V.A. 2003. Stopovers of Anseriformes during spring migration in North Dvina delta. In: Management and conservation of waterfowl populations in Northern Eurasia (with special focus on the White Sea-Baltic Flyway). Petrozavodsk, Russia. Pp. 6-8.
2	Artyukhov A.I. 2003. Migration and status of geese in Bryansk region during last 25 years. Management and conservation of waterfowl populations in Northern Eurasia (with special focus on the White Sea-Baltic Flyway). Petrozavodsk, Russia. Pp. 8-9.
3	Avdanin V.O., P.M. Glazov, V.A. Grabovsky & M.G. Sinitsyn. 2005. Principal places of goose concentration during spring migration in Kostroma Region. In: Waterfowl of Northern Eurasia. Third International Symposium Abstracts. Saint-Petersburg. Pp. 7-8.
4	Bragina, T.M. and E.A. Bragin (Eds). 2002. *The most important wetlands of North Kazakhstan (Kostanai Oblast and west part of North-Kazakhstan Oblast)*. Moscow: Russkiy Universitet Publishers. 156 pp. (In Russian).
5	Buzun V.A. 2005. Short review of waterbird migration and breeding in east part of Finland Bay and on Ladoga Lake. Waterfowl of Northern Eurasia. Pp. 50-53.

6	Djamirzoyev G., G. Magomedov, Yu. Pishvanov & L. Prilutskaya. 2004. *Birds of Dagestansky Nature Reserve.* Makhachkala. 95 pp. (In Russian)
7	Fokin, S., Kuzyakin, V., Kalchreuter, and Kirby, J.S. 2000. *The Garganey in the former USSR. A compilation of life-history information.* Wetlands Internationalglobal Series 7, Wageningen, The Netherlands.
8	Frolov V.V., S.A. Korkina, D.V. Gomzin & A.V. Frolov. 2003. Nesting Anseriformes of the Penza Oblast. Casarca N 9. Moscow, pp. 344-361.
9	Gineev A.M., V.P. Belik & B.A. Kazakov. 2002. Russia. Directory of Azov-Black Sea Coastal Wetlands. Kyiv. Wetlands International. 229 p.
10	Gineev, Krivenko 1998 (Wetlands in Russia 1).
11	Gistsov A.P. 2004. Waterbird monitoring in North Caspian Sea in 2003. Kazakhstan Ornithological Newsletter. Almaty, Kazakhstan. Pp. 19-20.
12	Golovnyuk, V.V. 2005. Distribution and numbers of geese in mouth of Upper Taimyra River, Taymyr. Waterfowl of Northern Eurasia. Pp. 86-87.
13	Gordienko N.S. 2001. Current status of swans and geese in the Southern Zauralie (the Chelabinsk region). In: Problems of waterbird study and conservation in Eastern Europe and Northern Eurasia. Moscow, Russia.
14	Gurtovaya E., P. Tolvanen, T. Eskelin, I. Olsen, T. Bragina, T. Aravak, G. Eichhorn, A. Arkiomaa & S. Timonen. 1999. Preliminary results of the Lesser White-fronted Goose monitoring in Kazakhstan in October 1999. Casarca, N 5, Moscow, Russia. Pp. 145-154.
15	IWC database
16	IWC 2005 data
17	Kazakov, B.A., N.H. Lomadze, V.P. Belik et al. 2004. *Birds of the Northern Caucasia.* Volume 1: Gaviiformes, Podicepediformes, Procellariiformes, Ciconiiformes, Phoenicopteriformes, Anseriformes. Rostov-on-Don. 398 p. (In Russian).
18	Kellomaki E., T. Khohlova, A. Lehtinen, N. Ripatti, P. Rusanen & P. Uronen. 2003. Stop-over sites of migrating geese in Kargopol district, Arkhangelsk region, NW-Russia. In: Management and conservation of waterfowl populations in Northern Eurasia (with special focus on the White Sea-Baltic Flyway). Petrozavodsk, Russia. Pp. 194-195.
19	Kondratyev A.V. & V.A. Buzun. 2003. Autumn migration of geese and other waterfowl on Il'men' Lake in 2002. In: Management and conservation of waterfowl populations in Northern Eurasia (with special focus on the White Sea-Baltic Flyway). Petrozavodsk, Russia. Pp. 77-78.
20	Krivenko V.G. & V.G. Vinogradov. 2001. Current status of waterfowl resources in Russia and issues of its conservation. On: http://www.biodat.ru/chm/vbu/index.htm.
21	Krivenko V.G. (Ed.). 1999. Wetlands in Russia. Volume 1: Wetlands of International Importance. Wetlands International - AEME Publ. 52, 194 pp.
22	Krivenko V.G. (Ed.). 2000. Wetlands in Russia. Volume 3: Wetlands on the Ramsar Shadow List. Wetlands International Global Series No 6, 409 pp.
23	Kuchin A.P. 1998. Distribution and breeding of the Greylag Goose in the Altay Steppe and forest plains. In: Casarca, N 4. Pp. 143-149.
24	Kuznetsov, E.A., N.V. Anzigitova. 2002. Nesting numbers and summer distribution of the Mute Swan in the former USSR: A Review. In: Casarca, N 8. Pp. 199-232.
25	Kuznetsov, Anzigitova, Krivenko, Moshonkin, Kamennova, 1998 (Wetlands in Russia, 1).
26	Mishchenko A.L., O.V. Sukhanova, S.P. Kharitonov, V.A. Zubakin & S.V. Volkov. 2002. Current status of rare, vulnerable and game birds in the Vinogradovo floodplains, Moscow Region. In: Inventory, monitoring and conservation of Important Bird Areas of Russia. Issue 4. Moscow, Russia. Pp. 87-107.
27	Moskvitin S.S., I.G. Korobitsyn, O.Yu. Tyutenkov & A.S. Panin. 2004. Wader migration in the taiga zone of south-eastern West Siberia. In: Waders of the Eastern Europe and Northern Asia: Studies and Conservation. Pp. 151-157.
28	Nikolayev V.I. 1998. Birds of swamp landscapes of the National Park "Zavidovo" and Upper Volga. Tver'. Russia. 215 p.
29	Rusanov G.M., N.N. Gavrilov, A.K. Gorbunov et al. 2003. Structural changes in ecosystems of Astrakhan biosphere reserve caused by raising of the Caspian Sea level. Astrakhan. (In Russian).
30	Sazonov S.V. 2003. Spring stop-over sites of geese on Shuya farmlands in vicinity of Petrozavodsk. In: Management and conservation of waterfowl populations in Northern Eurasia (with special focus on the White Sea-Baltic Flyway). Petrozavodsk, Russia. Pp. 134-135.

31	Soloviev S.A. 2000. Potential IBAs of Omsk region. Inventory, monitoring and conservation of Important Bird Areas of Russia. Moscow, Russia. Pp. 133-135.
32	Sultanov E. (Ed.). 2000. *Potential Ramsar Sites of Azerbaijan*. Baku, Wetlands International-AEME Publ. 152 p. (in Azerbaijan and Russian languages).
33	Svazas S., A. Kozulin, G. Grishanov et al. 2003. Important Transboundary Belarusian-Lithuanian and Lithuanian-Russian Wetlands. Institute of Ecology of Vilnius University & "OMPO Vilnius" Publishers. Vilnius. 96 pp.
34	Sviridova T.V. & V.A. Zubakin. 2004. The influences of agricultural methods to the breeding waders (Moscow region). In: Waders of the Eastern Europe and Northern Asia: Studies and Conservation. Pp. 173-180.
35	Vinokurov, A.A. 2001. Red-breasted Goose. In: Red Data Book of Russian Federation. Moscow. Pp. 397-399.
36	Yakushev N.N & E.V. Zavialov. 2005. Dynamics of distribution and status of swans in north part of Lower Volga Valley. Waterfowl of Northern Eurasia. Pp. 292-293.
37	Yerokhov S.N. & N.N. Berezovikov. 2004. Ornithological observations in Kustanay region in autumn 2003. Kazakhstan Ornithological Newsletter. Almaty, Kazakhstan. Pp. 46-49.
38	Yerokhov S.N. 2003. Greylag Goose in Kazakhstan: distribution, numbers, and the main stages of the annual cycle. Casarca N 9. Moscow. Pp. 103-135.
39	Zimin V.B., N.V. Lapshin & A.V. Artemiev. 2001. Species composition and numbers of geese at the Olonets spring stopovers. In: Problems of waterbird study and conservation in Eastern Europe and Northern Eurasia. Moscow, Russia. Pp. 49-51.

This chapter starts with a review of numbers of 17 of the Higher Risk species identified in Chapter 1 in European Union Member States in the Breeding and non-breeding seasons. Four general analyses of site importance for Higher Risk waterbird species in Europe, west and Central Asia and Africa are then presented, showing: 1. Sites where high numbers of all waterbird species have been counted; 2. Sites where high numbers of the 17 Higher Risk species have been counted; 3. Sites where a high diversity of the 17 Higher Risk species occur together and have the opportunity to mix; and 4. Sites that hold both high numbers and a high diversity of the 17 example Higher Risk species. Because of outbreaks of HPAI in 2005-2006 in Russia, Central and Southwest Asia and Africa, within the flyways of many waterbird species that migrate to Europe, data from these regions are included in these analyses. This general section is followed by an Introduction to the data derived from Bird Ringing. 17 species accounts follow, which include a map and a table summarising the count data for each Higher Risk species, and maps and tables summarising the ring recovery data.

2.2 Summary of numbers of Higher Risk species in EU member States and Russia

2.2.1 Breeding Season

Table 2.2 is a summary of estimated numbers of breeding pairs of each of the 17 Higher Risk species in 24 EU member states. With a few exceptions, these data were compiled by BirdLife International (2004). None of the Higher Risk species were recorded as breeding in Malta. The numerical range presented for each species is the estimated number of breeding pairs (minimum to maximum estimates) compiled from national

Table 2.2: Estimated breeding populations (pairs) of 17 waterbird species considered to pose a High Risk of spreading Avian Influenza in Europe. Principal source: BirdLife International (2004). Estimated breeding populations in European Russia are also presented for comparison.

	Cygnus olor	Anser albifrons	Anser anser	Branta ruficollis	Anas penelope*	Anas strepera	Anas crecca	Anas platyrhynchos	Anas acuta	Anas querquedula	Anas clypeata	Netta rufina	Aythya ferina	Aythya fuligula	Chlidonias niger	Larus ridibundus	Vanellus vanellus	Min Total	Max total
Austria	350-500	0	500-700	0	0	200-300	70-120	10,000-20,000	1 -5	70-200	160-300	150-250	200-300	700-1,000	0	6,000-8,000	300-6,000	**18,700**	**37,675**
Belgium	341-469	0	1,200-1,300	0	0	1,100-1,200	500-700	25,000-35,000	9 -12	200	800-1,100	1	653-916	1,900-2,600	0	18,000-19,000	17,000-24000	**66,695**	**86,498**
Cyprus	0	0	0	0	0	0	0	20-60	0	3	0	0	0	0	0	0	0	**23**	**63**
Czech	440-500	0	620-650	0	0	1,800-2,500	60-100	25,000-45,000	√	60-120	70-120	200-250	9,000-17,000	12,000-24,000	10 to 20	50,000-100,000	7,000-10,000	**106,260**	**200,260**
Denmark	4,500-5,000	1,700-2,000 Greenland	6,000-10,000	0	0	300-500	0-10 Greenand	20,000-50,000	50-100	300-500	800-1,000	0-1	400-600	1,000-2,000	58-60	110,000-125,000	30,000-45,000	**175,108**	**241,771**
Estonia	2,000-2,500	0	1,000-1,200	0	10-100	700-1200	2,500-3,000	25,000-30,000	50-100	2,000-2,500	2,500-3,000	0	1,000-2,000	5,000-7,000	2,000-3,000	50,000-80,000	15,000-30,000	**108,760**	**165,600**
Finland	6,000-8,000	0	2,500-3,500	0	60,000-80,000	150-300	150,000-250,000	150,000-250,000	15,000-25,000	1,000-4,000	10,000-12,000	0	15,000-20,000	80,000-120,000	25-35	50,000-100,000	50,000-80,000	**589,675**	**952,835**
France	1,000-1,600	0	74	0	0	900-1,000	200-500	30,000-60,000	0-7	270-500	700-1,300	650-850	2,000-3,500	500-800	179-190	29,100-32,500	17,000-20,000	**82,573**	**122,814**
Germany	7,700-13,400	0	10,000-18,000	0	0	2,700-5,000	3,700-5,800	210,000-470,000	15-24	1,200-1,900	2,100-3300	420-540	4,500-7,500	11,000-16,000	860-1,000	136,000-167,000	67,000-104,000	**457,195**	**813,464**
Greece	50-80	0	20-40	0	0	10-20	0	100-1000	0	0-10	0	0-5	0-20	0	50-150	0	50-100	**280**	**1,425**
Hungary	220-250	0	1,100-1,400	0	0	100-200	5 -15	100,000-150,000	30-50	1,200-1,500	500-600	20-50	5,000-10,000	30-70	400-1,000	7,000-15,000	93,000-150,000	**208,605**	**330,135**
Ireland	2,500-1,000	0	250-1,000	0	0	30-100	250-1,000	10,000-20,000	2	2	20-100	0	0-50	1,000-2,500	0	3,900	2,500-10,000	**20,454**	**39,654**
Italy	300-500	0	150-200	0	0	50-100	20-50	10,000-20,000	0	350-500	150-200	40-60	300-400	40-50	150-200	500-1,000	1,700-1,900	**13,750**	**25,160**
Latvia	600-800	0	30-80	0	10-100	100-300	2,000-5,000	30,000-40,000	0-20	1,000-2,000	200-400	0-5	1,500-2,000	800-1200	2,000-3,000	32,000	12,000-15,000	**82,240**	**101,905**
Lithuania	1,000-1,500	0	100-150	0	10-100	100-150	2,000-3,000	70,000-100,000	5 to 20	2,000-3,000	150-300	0	3,000-4,000	4,000-6,000	2,000-4,000	30,000-60,000	18,000-20.000	**132,365**	**202,220**
Luxembourg	35-45	0	0	0	0	√	0	1,000-1,500	0	0	√	0	√	2 to 5	0	0	20-30	**1,057**	**1,580**
Netherlands	5,500-6,500	0	8,000-9,000	0	20-30	6,000-7,000	2,000-2,500	350,000-500,000	20-30	1,600-1,900	8,000-9,000	120-170	1,700-2,100	14,000-18,000	1,000-1,250	132,000-137,000	200,000-300,000	**729,960**	**994,480**

Table 2.2 continued

	Cygnus olor	Anser albifrons	Anser anser	Branta ruficollis	Anas penelope*	Anas strepera	Anas crecca	Anas platyrhynchos	Anas acuta	Anas querquedula	Anas clypeata	Netta rufina	Aythya ferina	Aythya fuligula	Chlidonias niger	Larus ridibundus	Vanellus vanellus	Min Total	Max total
Poland	6,500-7,000	0	3,200-3,600	0	√	2,000-2,200	1,300-1,700	200,000-400,000	10 to 20	2,000-3,500	1,300-2,000	15-20	20,000-30,000	15,000-25,000	4,000-5,000	110,000-120,000	100,000-150,000	**465,325**	**750,040**
Portugal	0	0	0	0	0	150-250	0	3,000-10,000	0	0-5	0-5	40-100	20-50	0-5	0	0-5	0-25	**3,210**	**10,440**
Slovakia	100-400	0	15-80	0	0	50-80	10 -40	12,000-20,000	0-10	100-200	10 to 40	10 to 30	500-1,000	250-500	40-150	9,000-17,000	2,500-5,000	**24,585**	**44,530**
Slovenia	50-70	0	0	0	0	3 -5	0-10	10,000-20,000	0	20-30	0-10	0	10 to 40	30-60	0	150-300	2,000-3,000	**12,263**	**23,525**
Spain	0	0	0	0	0	2,500-3,900	7-42	65,500-100,000	0-50	50-250	50-250	2,500-10,000	2,500-10,000	0-50	30-60	2,500-10,000	1,000-2,500	**76,637**	**137,102**
Sweden	4,500-7,500	0	15,000-20,000	0	20,000-30,000	400-800	50,000-80,000	175,000-250,000	600-1,100	250-400	1,000-1,500	0	1,000-1,700	20,000-50,000	190-200	75,000-125,000	50,000-100,000	**412,940**	**668,200**
UK	12,000	0	15,600-15,800	0	300-500	790	1,600-2,800	63,000-158,900	12 to 40	23-114	1,000-1,500	0	324-426	10,200-11,500	0	138,000	137,000-174,000	**379,849**	**516,370**
EU Min Total	**55,686**	**1,700**	**65,359**	**0**	**80,350**	**20,133**	**216,222**	**1,594,620**	**15,794**	**13,698**	**29,510**	**4,166**	**68,607**	**177,452**	**12,992**	**989,150**	**823,070**	**4,168,509**	
EU Max Total	**69,614**	**2,000**	**86,774**	**0**	**110,830**	**27,895**	**356,387**	**2,751,460**	**26,583**	**23,334**	**38,025**	**12,332**	**113,602**	**288,340**	**19,315**	**1,290,700**	**1,250,555**		**6,467,746**
European Russia Min	15,000	60,000	20,000	>27,000	200,000	32,000	665,000	1,300,000-	300,000-	320,000	140,000	20,000	95,000	530,000	50,000	200,000	600,000	**2,947,000**	
European Russia Max	20,000	70,000	45,000	27,000	200,000	55,000	740,000	1,700,000	325,000	475,000	160,000	40,000	265,000	560,000	100,000	500,000	1,100,000		**6,382,000**

sources by BirdLife experts in each country. The table also includes the estimated number of breeding pairs of each of these species in European Russia because of the outstanding importance of this country for waterbirds in the breeding season. Most species breed in even higher numbers east of the Urals than in European Russia, but data are incomplete and accurate totals are very difficult to estimate.

From Table 2.2, the importance of each EU member state as a breeding area for Higher Risk waterbird species can be ranked as presented in Table 2.3. The maximum estimate from each country in BirdLife International (2004) has been used to compile the table.

Table 2.3: Total numbers (pairs, all species combined) of 17 Higher Risk waterbird species estimated to breed in 24 EU Member States, summarized and ranked by country.

Number of Higher Risk waterbird pairs estimated	Country
500,000-1,000,000	The Netherlands Finland Germany Poland Sweden UK
250,000 - 500,000	Hungary
125,000 - 250,000	Denmark Lithuania Czech Republic Estonia Spain
75,000 - 125,000	France Latvia Belgium
37,500 - 75,000	Slovakia Ireland Austria
18,750 - 37,500	Italy Slovenia
9,375 - 18,750	Portugal
< 9,375	Luxembourg Greece Cyprus

The number of pairs of the 17 Higher Risk waterbird species estimated to breed in each member state of the EU is strongly affected by the latitude and longitude of the country and by the availability of suitable habitat. For most species, countries in northern and eastern Europe are closer to the core of the breeding range in Russia and these countries hold relatively high numbers in the breeding season. Examples of such important countries in northern and eastern Europe are Finland, Poland, Sweden Denmark and the Baltic states. The importance of The Netherlands, Germany and the UK can be explained by their importance for the three most numerous Higher Risk species in the EU: Mallard,

Black-headed Gull and Northern Lapwing. EU member states in southern Europe hold relatively small numbers of Higher Risk species in the breeding season, and Cyprus, Greece, Portugal and Italy are all near the bottom of Table 2.3, Even Spain and France, relatively large countries, are below much smaller countries further to the north and east such as Denmark, Lithuania and Estonia.

The number of Higher Risk species breeding in European Russia is included in Table 2.2 and for all species combined is roughly the same as the number estimated to breed in all EU member states combined. In fact, only four species are estimated to have higher breeding populations in all EU member states combined than in European Russia: Mallard, Black-headed Gull, Greylag Goose and Mute Swan. The freezing in winter of most of Russia and other countries in eastern and northeastern Europe is the driving force behind migration patterns of waterbirds east and south into the rest of Europe, Africa, the Middle East and beyond.

The number of each Higher Risk species breeding in the 25 EU countries can be ranked and summarized from Table 2.2 in a similar way (Table 2.4).

Table 2.4: Total numbers (pairs) of 17 Higher Risk waterbird species estimated to breed in 24 EU Member States, summarized and ranked by species.

Summed maximum national totals (pairs) in 24 EU member states	Species
>2,000,000	Mallard
1,000,000 - 2,000,000	Black-headed Gull Northern Lapwing
500,000 – 1,000,000	-
250,000 - 500,000	Common Teal Tufted Duck
125,000 - 250,000	-
75,000 - 125,000	Common Pochard Eurasian Wigeon Greylag Goose
37,500 - 75,000	Mute Swan Northern Shoveler
18,750 - 37,500	Gadwall Northern Pintail Garganey Black Tern
9,375 - 18,750	Red-crested Pochard
< 9,375	Greater White-fronted Goose (Greenland)
0	Red-breasted Goose

The most numerous Higher Risk species found in EU states in the breeding season is Mallard, and other very numerous species (more than one million counted) are Black-headed Gull and Northern Lapwing. 12 of these species are present in the European Union in the breeding season in only modest numbers (fewer than 125,000 pairs)

reflecting the preference of a majority of Anatidae species to breed further north and east in Russia (see Table 2.2 for estimated totals breeding in European Russia).

2.2.2 Non-breeding season

Table 2.5 is a summary of peak national totals of Higher Risk species in the 24 EU member states that contribute to IWC (the one non-contributing state is Malta, which holds very few waterbirds). The number presented for each species is the highest total obtained by summing all January counts from all sites in each country in each year between 1990 and 2005. In most countries, the seventeen Higher Risk species represent about half of the waterbirds counted in January each year. It should be remembered that counts are always an under-estimation of actual numbers, since a certain proportion of every species is missed by the January counts. This proportion is highest in species with a dispersed winter distribution and those with inconspicuous behaviour.

From Table 2.5, the importance of each EU member state as a wintering area for Higher Risk waterbird species can be ranked as presented in Table 2.6.

Table 2.6: Total numbers of 17 Higher Risk waterbird species counted in 24 EU Member States in January, summarized and ranked by country.

Number of Higher Risk waterbirds counted	Country
>2,000,000	The Netherlands
1,000,000 - 2,000,000	Germany UK France Spain
500,000 – 1,000,000	Italy Greece
250,000 - 500,000	Hungary Denmark Ireland
125,000 - 250,000	Sweden Poland Austria
75,000 - 125,000	Portugal Czech Republic
37,500 - 75,000	Belgium Slovakia Estonia Slovenia
18,750 - 37,500	Latvia
9,375 - 18,750	Finland Cyprus Lithuania
< 9,375	Luxembourg

The number of Higher Risk waterbirds counted in each member state of the EU in midwinter is roughly proportional to the area of the country, with a number of notable

exceptions. The Netherlands, The UK, Denmark, Ireland and Greece are relatively small countries with disproportionately high numbers of wintering waterbirds. This is because of the large numbers of wetlands in these countries, all of which have long coastlines, and are situated outside, but not very distant from, the normal zone of January freezing of wetlands. Sweden, Poland and Finland hold fewer waterbirds in winter than their geographical area might be expected to support, but all three countries are affected heavily by January freezing of wetlands.

The number of each Higher Risk species wintering in the 25 EU countries can be summarized from Table 2.5 in a similar way (Table 2.7).

Table 2.7: Total numbers of 17 Higher Risk waterbird species counted in 24 EU Member States in January, summarized and ranked by species.

Summed maximum national totals in 24 EU member states	**Species**
>2,000,000	Mallard
1,000,000 - 2,000,000	Eurasian Wigeon, Northern Lapwing Greater White-fronted Goose Black-headed Gull Tufted Duck
500,000 – 1,000,000	Common Teal Common Pochard Greylag Goose
250,000 - 500,000	Northern Shoveler
125,000 - 250,000	Northern Pintail Mute Swan
75,000 - 125,000	Gadwall
37,500 - 75,000	Red-crested Pochard
18,750 - 37,500	-
9,375 - 18,750	-
< 9,375	Red-breasted Goose Garganey Black Tern

The most numerous Higher Risk species found in EU states in winter (as in the breading season) is Mallard, and other very numerous species (more than one million counted) are diverse, including a goose, a dabbling duck, a diving duck, a wader and a gull. Three of these species are present in the European Union in winter in very low numbers: Red-breasted Goose (most of which winter on the Black Sea coast of Bulgaria, Romania and Ukraine), Garganey and Black Tern (both of which largely winter in Subsaharan Africa).

Table 2.5: Peak national total count of selected Higher Risk waterbird species in January between 1990 and 2005

	Cygnus olor	Anser albifrons	Anser anser	Branta ruficollis	Anas penelope	Anas strepera	Anas crecca	Anas platyrhynchos	Anas acuta	Anas querquedula	Anas clypeata	Netta rufina	Aythya ferina	Aythya fuligula	Chlidonias niger	Larus ridibundus	Vanellus vanellus	TOTAL
Austria	3,203	32,975	12,815	2	831	2,416	3,217	58,288	64	5	252	154	10,371	29,033	0	30,431	1	**184,058**
Belgium	311	315	176	1	237	359	2,740	20,585	22	1	213	10	12,359	3,115	0	21,258	2,596	**64,298**
Cyprus	37	500	1	5	794	61	2,198	1,402	306	14	1,982	128	690	121	0	5,004	585	**13,828**
Czech	2,115	8,030	1,044	0	85	10	427	49,327	17	110	4	3	5,091	5,289	0	9,754	2	**81,308**
Denmark	31,184	4,475	111,027	1	23,410	74	2,778	66,646	4,326	0	37	1	12,501	146,057	0	9,234	2,932	**414,683**
Estonia	5,510	53	15,670	0	2	2	3	21,890	0	0	1	0	16	294	0	377	0	**43,818**
Finland	2,299	0	0	0	299	2	71	8,711	1	0	0	0	4	3,301	0	25	0	**14,713**
France	11,586	296	14,610	1	57,172	20,553	133,387	285,324	26,331	3	45,173	4,271	100,993	72,719	8	325,494	385,257	**1,483,178**
Germany	57,812	451,720	26,302	9	177,967	15,745	40,661	640,332	3,916	103	2,614	24,405	137,388	341,290	0	15,885	5,157	**1,941,306**
Greece	7,602	11,509	816	769	80,930	6,272	185,970	89,445	43,902	0	37,408	181	69,690	12,832	1	47,546	14,842	**609,715**
Hungary	871	225,348	63,485	99	5,275	2,307	18,204	148,599	740	25	13,354	269	9,359	4,320	0	6,789	245	**499,289**
Ireland	5,146	10,024	5,622	1	73,011	515	28,037	16,621	1,655	2	2,474	2	13,861	13,282	0	26,446	215,852	**412,551**
Italy	3,248	11,049	5,392	4	123,936	7,822	97,529	208,761	12,781	223	22,811	498	42,189	7,725	2	217,468	69,708	**831,146**
Latvia	5,110	3	9	0	5	1	16	21,760	8	0	1	0	12	170	0	357	0	**27,452**
Lithuania	1,499	0	71	0	3	5	1	7,528	0	0	0	3	160	353	0	0	0	**9,623**
Luxembourg	0	14	0	0	0	0	0	250	0	0	0	1	100	400	0	0	0	**765**
Netherlands	9,044	620,373	110,505	11	614,859	11,155	23,721	296,260	27,234	0	4,263	37	52,474	131,377	0	92,815	133,977	**2,128,105**
Poland	10,325	2,018	95	0	246	5	1,233	101,811	5	1	13	0	4,749	53,236	0	11,114	1	**184,852**
Portugal	1	1	4,451	0	20,208	1,333	37,628	12,128	14,127	0	15,651	642	2,674	1,459	0	1,369	4,038	**115,710**
Slovakia	453	300	1,500	0	42	43	369	43,694	7	10	6	0	9,271	2,402	0	3,634	4	**61,735**
Slovenia	725	250	247	0	871	49	2,929	20,938	59	1	90	2	2,631	2,370	0	7,703	194	**39,059**
Spain	43	32	99,386	0	98,241	15,974	133,600	222,307	37,833	73	116,498	19,334	60,841	5,735	2	216,280	148,017	**1,174,196**
Sweden	13,539	0	42	0	7,773	44	580	93,546	148	0	15	1	3,529	108,360	0	0	2	**227,579**
UK	18,607	3,850	62,929	5	387,385	15,269	167,602	195,398	23,035	3	10,910	133	41,525	57,263	0	286,500	466,204	**1,736,618**
Total	**190,270**	**1,383,135**	**536,195**	**908**	**1,673,582**	**100,016**	**882,901**	**2,631,551**	**196,517**	**574**	**273,770**	**50,075**	**592,478**	**1,002,503**	**13**	**1,335,483**	**1,449,614**	**12,299,585**

2.3 Summary of combined counts of all waterbird species

Figure 2.1. and Table 2.8 summarize the results of the International Waterbird Census (IWC) for all the approximately 220 species included in Europe, North Africa, West and Central Asia. Site totals presented on the map and table were compiled by summing the peak counts of each waterbird species at each site in the period 1990-2005, regardless of the year in which the peak count of each species was made. No appropriate data were available from sub-Saharan Africa for this analysis.

It should be remembered that many species in addition to the 17 selected for detailed analysis carry a risk of catching and spreading Avian Influenza, and that all sites holding large numbers of waterbirds have the potential to act as significant reservoirs of the disease. This map and table thus include sites of high relevance to the spread of Avian Influenza in Europe.

Sites recording high January counts of waterbirds are spread throughout the region, but the sites holding the very highest numbers are mostly in West and Central Asia. One site, Big Kyzyl Agach (Gyzylagach) Bay in Azerbaijan, has a site total of well over one million waterbirds and three further sites have totals exceeding half a million, two of which are also in Azerbaijan and the third in Iran. Of the 91 sites in this region detailed in Table 2.1 that have held more than 100,000 waterbirds, 50 (55%) are in Europe. Of the 17 sites with totals higher than 250,000, however, only five are in Europe. These are The Danish Wadden Sea, The Crimea region (Sivash), Ukraine, The Wash (UK), Shabla Lake (Bulgaria) and Skadar Lake (Serbia & Montenegro-Albania).

The bias in distribution of important sites for wintering waterbirds in Central and West Asia and the Black Sea/East Mediterranean region reflects the breeding distribution of a high proportion of these birds in Russia, from where they migrate south and west each autumn in response to freezing weather. Movement to Central and Western Europe and to Africa involves a longer migration, a strategy adopted by large numbers of birds, but fewer than those migrating the shorter distances to Central and West Asia and the Black Sea/East Mediterranean region.

Table 2.8: Peak January site totals between 1990 and 2005 of all waterbird species combined, at sites covered by the International Waterbird Census in Europe, West and Central Africa. The peak counts of each waterbird species at each site in this period have been summed to produce site totals. All sites where totals of 60,000 or more have been recorded are shown. No appropriate data are available for sub-Saharan Africa.

Country	Sitename	Count
Albania	Karavasta Complex	82060
Albania	Narta Complex	81267
Algeria	Lac Oubeira	90982
Azerbaijan	Big Kyzyl-Agach Bay	1268904
Azerbaijan	Kirov Bay	628360
Azerbaijan	Sarysu Lake (Sarasuy)	501153
Azerbaijan	Aggel (Ah Gol) Lake	110906
Azerbaijan	Shah Cape (Apsheron Peninsula)	80917
Azerbaijan	Kura River Estuary	75288
Azerbaijan	Little Kyzyl-Agach Bay	72184
Bulgaria	Shabla Lake (+ Ezeretz)	272577

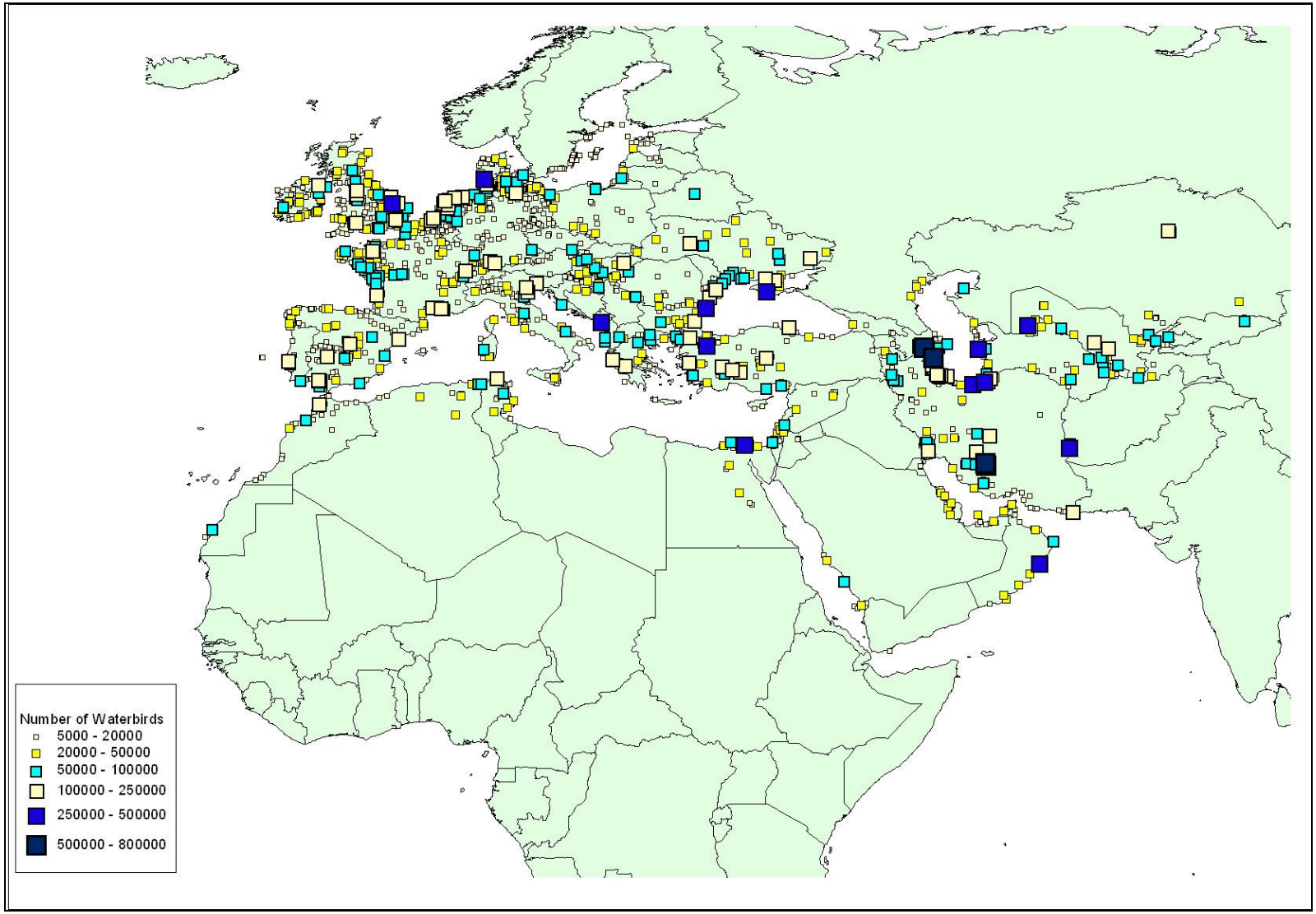


Figure 2.1: Peak January counts between 1990 and 2005 of all waterbird species combined, the peak counts of each waterbird species at each site in this period have been summed to produce site totals. No appropriate data are available for sub-Saharan Africa.

Table 2.8 continued

Country	Sitename	Count
Bulgaria	Durankulak Lake Complex	132732
Bulgaria	Mandra Lake	106602
Bulgaria	Burgas Lake (Vaya)	67172
Bulgaria	Piasachnik Reservoir	62306
Croatia	Vranjsko Jezero	71057
Czech Rebublic	Nove Mlyny I & Iidam Systems	76480
Denmark	Danish Wadden Sea	498894
Denmark	Roskilde Fjord	94640
Denmark	Lolland NW	87744
Denmark	Sydfynske Hav	78083
Egypt	Lake Manzala	254851
Egypt	Lake Burullus	98869
France	La Camargue	202514
France	Baie Du Mont Saint Michel	126718
France	Bassin D'Arcachon	126708
France	Etangs Montpellierains (34+30)	107540
France	Littoral Du Pas De Calais	99878
France	Cours Du Rhin (67 / 68)	98743
France	Etangs De La Brenne	98666
France	Résèrve Naturelle De Moeze (Charente-Seudre)	91124
France	Baie De L'Aiguillon Et Pointe D'Arcay	90144
France	Presqu'Île Guérandaise Dont Traicts Du Croisic	81182
France	Littoral Picard	73467
France	Etangs Et Lacs Du Bocage Vendéen	72521
France	Golfe Du Morbihan	72441
France	Lac De Grandlieu	67640
Germany/ Switzerland/Austria	Bodensee Gesamt	226119
Germany	Wismar-Hohen Wieschendorfer Huk	206233
Germany	Wattenmeer Sh 08	115979
Germany	Wattenmeer Sh 10	97451
Germany	Wattenmeer Sh 06	96865
Germany	Wattenmeer Sh 07	96679
Germany	Vorland Jadebusen	91474
Germany	Wattenmeer Sh 12	64388
Germany / Switzerland / Austria	Spiekeroog	62847
Greece	Evros Delta	242396
Greece	Amvrakikos Wetlands	217484
Greece	Messolonghi Lagoon (From River Evinos To River Acheloos)	103098
Greece	Kerkini	95605
Hungary	Hortobagy Halasto	200065
Hungary	Geszt. Begecsi Halastavak	61191
Hungary	Velencei To	60300
Iran	Bakhtegan & Tashk Lakes	760330
Iran	Miankaleh W.R. & Gorgan Bay: Miankaleh Protected Region	343397
Iran	Fereydoon Kenar, Ezbaran & Sorkh Rud Damgahs: Damgah Fereydoon Ke	326523
Iran	Hamoun Lakes Complex: Kuh-I-Khajeh	251781
Iran	Gomishan Marsh	214849
Iran	Miankaleh W.R. & Gorgan Bay: Gorgan Bay	196510
Iran	Shadegan Marshes Protected Region: Total	151822
Iran	Anzali Mordab Complex: Anzali Mars West (Main Lagoon)	137791

Table 2.8 continued

Country	Sitename	Count
Iran	Kaftar Lake	135522
Iran	Govater Bay & Hur-E-Bahu:	131519
Iran	Anzali Mordab Complex: Siakeshim Protected Region	130905
Iran	Ezbaran Damgah	128362
Iran	Anzali Mordab Complex: Anzali Marsh East	126430
Iran	Paein Rud Posht Ab-Bandan	125826
Iran	Caspian Coast: Ashuradeh-Khazarabad(Farahabad)	124336
Iran	Amirlayeh & Sheikh Ali Kol: Amirlayeh Lake	119517
Iran	Anzali Mordab Complex: Selkeh Protected Region	110970
Iran	Lavandavil Wildlife Refuge: Lavandavil Marsh	108660
Iran	Anzali Mordab Complex: Part Of Siahkeshim Protected Region	101445
Iran	Urmiyeh (Uromiyeh) Lake: West Marshes	94944
Iran	Anzali Mordab Complex: Sorkhankel	92738
Iran	Govater Bay & Hur-E-Bahu: Bahookalat River	89305
Iran	Gavekhoni Marsh	86966
Iran	Hamoun Lakes Complex: Hamoun-E-Saberi	85095
Iran	Maharloo Lake	77080
Iran	Caspian Coast (Gilan): Astara - Hashtpar	75980
Iran	Hamidieh Grassland	75792
Iran	Aras River: Bralan - Aras Dam	75045
Iran	Chookam Ab-Bandan	74793
Iran	Harm Lake Complex: Harmkarion Lake (Near Khunj)	65699
Ireland	Shannon And Fergus Estuary	69124
Italy	Laguna Di Venezia	181026
Italy	Delta Del Po - Parte Veneta	163498
Italy	Laguna Di Grado E Marano	105778
Italy	Manfredonia	65202
Italy	Trasimeno	63372
Italy	Oristano	63231
Kazakhstan	Kurgaldjinskyi Reserve	186214
Kazakhstan	Sholack Lake	70000
Kazakhstan	Caspian Coast. O-Va Durneva-Turkmenia Border (300Km	66200
Kyrgyzstan	Issyk-Kul Lake: Total	91387
Lithuania	Kursiu Spit Seashore	71399
Morocco	Merja Zerga: Kenitra	133966
Netherlands	Texel-Vlieland (Meltofte 28)	192551
Netherlands	Ameland-North Coast Of Friesland (Meltofte 25)	185750
Netherlands	Ijsselmeer	152439
Netherlands	Oosterschelde	133321
Netherlands	Afsluitdijk-Balgzand (Meltofte 29)	119792
Netherlands	Griend-Frisian Nothwest Coast (Meltofte 27)	114006
Netherlands	Markermeer	111351
Netherlands	Rottum-North Coast Of Groningen (Meltofte 23)	105821
Netherlands	Westerschelde	103585
Netherlands	Friese Noordkust	82185
Netherlands	Terschelling (Meltofte 26)	79907
Netherlands	Oosterschelde	76844
Netherlands	Ijssel	72686
Netherlands	Limburgse Maas	66392
Netherlands	Waddenzee: Open Water West	64152
Netherlands	Veluwemeer	61544

Table 2.8 continued

Country	Sitename	Count
Oman	Barr Al Hikman	336988
Poland	Zalew Szczecinski	65488
Portugal	Estuário Do Tejo	110740
Portugal	Ria De Faro	65985
Romania	Delta Dunarii (Danube Delta)	130703
Romania	Chituc (Vadu-Periboina)	121670
Romania	Lake Sinoe (= Sinoie)	92515
Romania	Portile De Fier Reservoir (Romanian Part)	82111
Romania	Golovita (Bisericuta-Gr. Lupilor)	80693
Saudi Arabia	Red Sea Shore: (Southern) Jeddah To Jizan	65955
Slovakia	Podunaji (Danube Floodplain)	74042
Spain	Parque Nacional De Doñana (Consolidation)	241848
Spain	Lucios De Beta La Palma-Isla Mayor (Se)	169036
Spain	Delta Del Ebro (T)	163704
Spain	Lucio De Los Ansares (Se)	135897
Spain	Gravera Del Porcal (M)	107385
Spain	Embalse De Sierra Brava	101186
Spain	Marisma De Hinojos (H)	100856
Spain	Parque Natural De La Albufera (V)	94689
Spain	Los Pobres. Lucios De Beta La Plama (Consolidated)	93817
Spain	Del Palacio A La Algaida (H)	84464
Spain	Caño Del Guadiamar Pnd (H)	77085
Spain	Laguna De Gallocanta (Z)	71715
Spain	De La Algaida A Hato Villa (H)	70500
Spain	Saco Interior De La Bahía De Cádiz	66384
Spain	Marismas P.N. Bahía De Cádiz	66084
Spain	Lucio Del Membrillo (H)	63970
Spain	Lucios De Veta Lengua Y Aguas Rubias (H)	62590
Switzerland	Lac De Neuchâtel	121230
Switzerland	Lac Léman-Ch	94295
Tunisia	Lac Ichkeul	125150
Turkey	Uluabat Golu (Apolyont Golu)	432137
Turkey	Egridir Golu	234784
Turkey	Beysehir Golu	213826
Turkey	Isikli Golu [Civril Golu]	211496
Turkey	Hirfanli Baraji	133834
Turkey	Kizilirmak (Karabogaz+Balik)	129662
Turkey	Camalti Salt Pans; Gediz Delta	126148
Turkey	Kizilirmak East (Balik)	93132
Turkey	Bafa Golu	91507
Turkey	Goksu Delta (Silifke)	91434
Turkey	Akyatan Golu	90851
Turkey	Meric Delta	73212
Turkey	Menderes Delta	70597
Turkmenistan	Lake Sarykamysh	341068
Turkmenistan	Krasnovodsk & North-Cheleken Bays	298473
Turkmenistan	Balkhan Gulf (Convention Mar)	96185
Turkmenistan	Khauzkhan Reservoir	92983
Turkmenistan	Caspian Coast: Guyjuk-Okarem	77100
Turkmenistan	Lake Ketdeshor (Kattashor)	66945
Ukraine	Crimea (Region)	404830

Table 2.8 continued

Country	Sitename	Count
Ukraine	E. Sivash	222105
Ukraine	Donetsk (Region)	193224
Ukraine	M. Sivash	151421
Ukraine	Khmelnitsk (Region)	117464
Ukraine	Black Sea State Biosphere Reserve	97726
Ukraine	Dnepropetrovsk (Region)	86719
Ukraine	Dzansheisky. Shagany; Alibey; Burnas Limans	84678
Ukraine	Dniestrovskiy Liman	63020
Ukraine	Zaporozhye (Region)	61697
Ukraine	Odessa (Region)	60634
United Kingdom	The Wash	295068
United Kingdom	Morecambe Bay	215367
United Kingdom	Thames Estuary	210873
United Kingdom	Ribble Estuary	166283
United Kingdom	Humber Estuary	154590
United Kingdom	Somerset Levels	114209
United Kingdom	Loughs Neagh & Beg	111066
United Kingdom	North Norfolk Coast	102609
United Kingdom	Mersey Estuary	95134
United Kingdom	Swale Estuary	84353
United Kingdom	Breydon Water & Berney Marshes	80888
United Kingdom	Medway Estuary	79408
United Kingdom	Blackwater Estuary	74980
United Kingdom	Strangford Lough	74425
United Kingdom	Severn Estuary (English Counties)	74068
United Kingdom	Solway Estuary (Scottish Counties)	72368
United Kingdom	Lower Derwent Ings	72195
United Kingdom	Forth Estuary	69050
United Kingdom	Alt Estuary	66072
United Kingdom	Solway Estuary (English Counties)	60357
Uzbekistan	Kuyumasar	144323
Uzbekistan	Karakir Lakes System	144171
Uzbekistan	Syrdarya River . Fergana Valley-Chardara Reservoir	97571
Uzbekistan	Tuyabuguz Reservoir	80254
Uzbekistan	Amudarya River (High Part Of The Stream)	60905
Serbia & Montenegro - Albania	Skadarsko Jezero	250571

2.4 Summary of combined counts of 17 selected Higher Risk waterbird species

Figure 2.2 and Table 2.9 present IWC results of combined January counts of waterbird species at sites similar to those in Figure 2.1 and Table 2.8, but only including the subset of 17 species selected as Higher Risk species for detailed analysis. There are similarities between the results, and the inclusion of data from Africa reveals the particular importance of the Sahel zone of West Africa for some of these species. This subset of species also appears to make less use of coastal sites than all waterbird species combined, and this is likely to be a reflection of the large numbers of waders (shorebirds) that feature in the IWC data but represented by only one species, Northern Lapwing, in the Higher Risk species.

The inclusion of data from the Russian literature and from the African dataset of the IWC for these species gives a more complete picture of important sites than was possible for all waterbird species combined from the IWC data alone (Figure 2.1, Table 2.8). West and Central Asia and the Black Sea/East Mediterranean again feature strongly as holding a high number of the most important sites. Of the 10 sites holding more than 250,000 of these 17 "Higher Risk" species, two are in Russia, two in Azerbaijan, two in Iran, and one each in Kazakhstan, Bulgaria, Senegal and Mali. Of the 58 sites in this region detailed in Table 2.9 that have held more than 50,000 Higher Risk waterbirds, 32 (55%) are in Europe. Of the 10 sites where more than 100,000 Higher Risk waterbirds have been counted, however, only two are in Europe: The Shabla Lake complex in Bulgaria, and the Neman River Delta in Russia.

Table 2.9: Peak January site totals between 1990 and 2005 of 17 waterbird species considered to pose a High Risk of spreading Avian Influenza in Europe, Africa, West and Central Asia. The peak counts of each Higher Risk waterbird species at each site in this period have been summed to produce site totals. All sites where peak count totals of 40,000 or more have been recorded are included.

Country	Sitename	Number of birds
Albania	Karavasta Complex	84647
Albania	Narta Complex	50528
Algeria	Lac Oubeira	65279
Algeria	Lac Fetzara	54786
Algeria	Marais De Mekhada	48815
Austria	Neusiedlersee. Seewinkel; Hansag	44110
Azerbaijan	Caspian Coast: Gyzylagach Nature Reserve	793392
Azerbaijan	Kirov Bay	282140
Azerbaijan	Sarysu Lake (Sarasuy)	127599
Bulgaria	Shabla Lake Complex	314814
Bulgaria	Durankulak Lake Complex	179660
Bulgaria	Burgas Lake (Vaya)	92662
Bulgaria	Mandra Lake Complex	90486
Bulgaria	Piasachnik Reservoir	76085
Bulgaria	Ovcharitza	51336
Bulgaria	Srebarna Lake	47057
Bulgaria	Black Sea Coast: Kavarna-Balchik-Kranevo	40126
Croatia	Kopacki Rit	53256
Denmark	Roskilde Fjord	70942
Denmark	Danish Wadden Sea	45821
Egypt	Lake Manzala	83643
Egypt	Lake Burullus	59365
France	La Camargue	196404
France	Etangs De La Brenne	102220
France	Cours Du Rhin (67 / 68)	88987
France	Etangs Montpellierains (34+30)	86780
France	Etangs Et Lacs Du Bocage Vendéen	76987
France	Baie Du Mont Saint Michel	71338
France	Lac De Grandlieu	63935
France	Lacs: Orient. Amance Et Temple-Auzon	56523
France	Loire Amont	54380
France	Presqu'Île Guérandaise Dont Traicts Du Croisic	48170

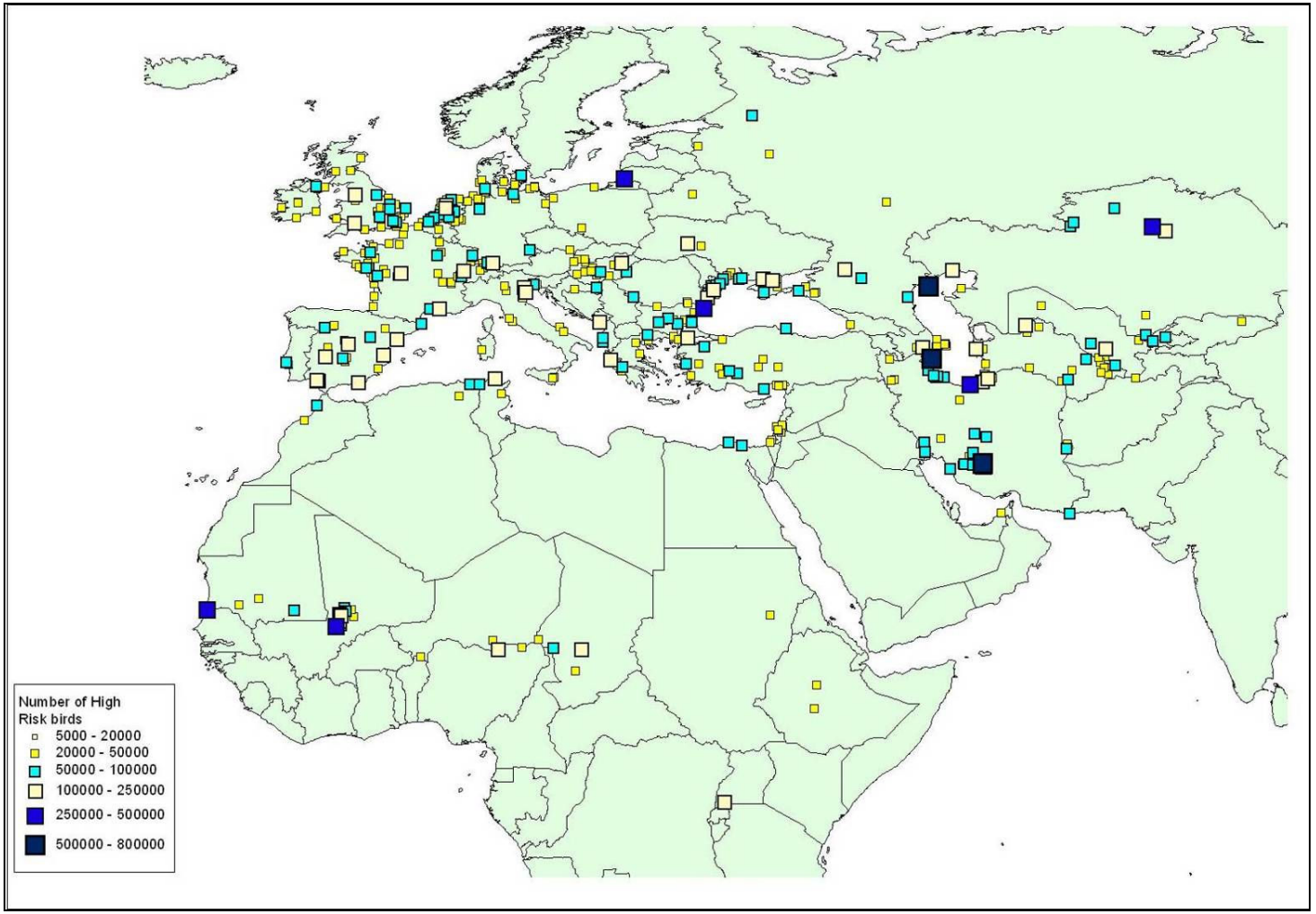


Figure 2.2: Peak January counts between 1990 and 2005 of 17 "Higher Risk" waterbird species. The peak counts of each of 17 waterbird species considered to pose a high risk of transmitting Avian Influenza at each site in this period have been summed to produce site totals.

Table 2.9 continued

Country	Sitename	Number of birds
France	Estuaire Seine	43154
France	Marais Poitevin	42495
France	Lac Du Der-Chantecoq (51 / 52)	41587
France	Etangs Du Nord Loire Atlantique	41313
France	Dombes-Vallée De L'Ain	40749
France	Baie De Morlaix + Penze	40349
Georgia	Paliastomi Lake	44470
Germany	Dümmer	61665
Germany	Wismar-Hohen Wieschendorfer Huk	58893
Germany	Wattenmeer Sh 10	51301
Germany	Donau: Km 2246-2405	50984
Germany	Wattenmeer Sh 08	42005
Germ./Switz./Austria	Bodensee gesamt	180311
Greece	Evros Delta	248525
Greece	Amvrakikos Wetlands	156101
Greece	Kerkini	98073
Greece	Messolonghi Lagoon (From River Evinos To River Acheloos)	51994
Greece	Axios, Loudias & Aliakmon Deltas	42272
Hungary	Hortobagy Halasto	163543
Hungary	Geszt. Begecsi Halastavak	58875
Hungary	Szabadszallas Szikes To = Kisret. Zabszek Knp	50893
Iran	Bakhtegan & Tashk Lakes	639096
Iran	Fereydoon Kenar, Ezbaran & Sorkh Rud Damgahs: Damgah Fereydoon Ke	407332
Iran	Gomishan Marsh	168520
Iran	Miankaleh W.R. & Gorgan Bay: Miankaleh Protected Region	131157
Iran	Ezbaran Damgah	126350
Iran	Govater Bay & Hur-E-Bahu: Bahookalat River	96688
Iran	Paein Rud Posht Ab-Bandan	95710
Iran	Anzali Mordab Complex: Anzali Mars West (Main Lagoon)	87376
Iran	Anzali Mordab Complex: Anzali Marsh East	84715
Iran	Anzali Mordab Complex: Siakeshim Protected Region	84180
Iran	Shadegan Marshes Protected Region: Total	82163
Iran	Anzali Mordab Complex: Selkeh Protected Region	76406
Iran	Gavekhoni Marsh	75259
Iran	Kaftar Lake	72920
Iran	Hamidieh Grassland	62368
Iran	Maharloo Lake	60594
Iran	Dasht-E-Arjan Marsh	59699
Iran	Amirlayeh & Sheikh Ali Kol: Amirlayeh Lake	59581
Iran	Hamoun Lakes Complex: Kuh-I-Khajeh	56807
Iran	Helleh River: River And Delta	56554
Iran	Anzali Mordab Complex: Sorkhankel	55154
Iran	Chookam Ab-Bandan	54565
Iran	Anzali Mordab Complex: Part Of Siahkeshim Protected Region	53322
Iran	Caspian Coast (Gilan): Anzali- Astara	50718
Iran	Miangaran Marshes: Miangaran & Izeh Marshes	45112
Iran	Hamoun Lakes Complex: Hamoun-E-Saberi	44847
Iran	Caspian Coast (Gilan): Astara – Hashtpar	40736
Israel	Southern Coastal Plain	48207
Italy	Delta Del Po - Parte Veneta	135783
Italy	Laguna Di Venezia	132222
Italy	Laguna Di Grado E Marano	66486
Italy	Oristano	44758

Table 2.9 continued

Country	Sitename	Number of birds
Italy	Manfredonia	41636
Kazakhstan	Small lakes north of Kurgaljin NR	451300
Kazakhstan	North Caspian Coast total	179493
Kazakhstan	Kurgaldjinskyi Reserve	118288
Kazakhstan	Kulykol Lake, Kustanay reg.	83800
Kazakhstan	Ayke Lake, Kustanay reg.	58700
Kazakhstan	Koybagar & Tyuntyugur Lakes, Kustanay reg.	58080
Kazakhstan	Chardara Vdchr	51090
Kazakhstan	Chuchkakol Lakes	48901
Kyrgyzstan	Issyk-Kul Lake: Total	42074
Mali	Delta Quad'S 101,102,107-110,115-117,125	356085
Mali	Delta Quad 46	194015
Mali	Delta Quad 33	165000
Mali	Delta Quad 84	135000
Mali	Delta Quad 93 (Walado Debo)	112457
Mali	Delta Quad 20	95000
Mali	Delta Quad 8	65200
Mali	Delta Quad 74	45890
Mali	Delta Quad 75	43000
Mauritanie	Mahmouda	77087
Mauritanie	Diawling	65716
Morocco	Merja Zerga: Kenitra	50601
Namibia	Walvis Bay Ramsar Site	61444
Netherlands	Markermeer	137376
Netherlands	Ijsselmeer	104666
Netherlands	Westerschelde	96187
Netherlands	Friese Noordkust	68610
Netherlands	Haringvliet	64524
Netherlands	Oosterschelde	64038
Netherlands	Gelderse / Brabantse Maas	60713
Netherlands	Ijssel	56336
Netherlands	Reeuwijkse Plassen E.O.	54543
Netherlands	Sneekermeer E.O.	49573
Netherlands	Limburgse Maas	48839
Netherlands	Biesbosch	47077
Netherlands	Krimpenerwaard	46721
Netherlands	Eemmeer. Nijkerkernauw En Nuldernauw	46435
Netherlands	Groningse Noordkust	43065
Netherlands	Lek	42652
Netherlands	Polder Zeevang	41530
Nigeria	Hadejia-Nguru, All Quadrats	187298
Portugal	Estuário Do Tejo	57573
Romania	Delta Dunarii (Danube Delta)	146432
Romania	Chituc (Vadu-Periboina)	127571
Romania	Lake Sinoe (= Sinoie)	116116
Romania	Golovita (Bisericuta-Gr. Lupilor)	79260
Romania	Portile De Fier Reservoir (Romanian Part)	67583
Romania	Razelm Nw	52420
Romania	Lakes Nuntasi And Tuzla	43631
Russia	Volga Delta	516562
Russia	Neman River delta	256000
Russia	Veselovskoye Reservoir	249200
Russia	Olonets Plain	82700
Russia	Lake Manych-Gudilo	71662

Table 2.9 continued

Country	Sitename	Number of birds
Russia	Kiziltashsky Liman Complex	65589
Russia	Kyzlyar Bay	63230
Russia	Penza Region	44000
Russia	Kryukovskoye Reservoir	40892
Russia	Wetlands of Upper Volga, Tver region	40340
Senegal	Parc National Des Oiseaux Du Djoudj	457946
Slovakia	Podunaji (Danube Floodplain)	41393
Spain	Parque Nacional De Doñana (Consolidation)	203001
Spain	Lucios De Beta La Palma-Isla Mayor (Se)	126941
Spain	Delta Del Ebro (T)	126310
Spain	Marisma De Hinojos (H)	118874
Spain	Parque Natural De La Albufera (V)	118844
Spain	Gravera Del Porcal (M)	105756
Spain	De La Algaida A Hato Villa (H)	104965
Spain	Lucio De Los Ánsares (Se)	101949
Spain	Embalse De Sierra Brava	100173
Spain	Caño Del Guadiamar Pnd (H)	89738
Spain	Laguna De Gallocanta (Z)	65871
Spain	Lucio Del Membrillo (H)	61613
Spain	Embalse De El Vicario (Cr)	58726
Spain	Aiguamolls De L´emporda (Gi)	56259
Spain	Del Palacio A La Algaida (H)	54969
Spain	Lagunas De Villafáfila (Za)	53402
Spain	Lucios De Veta Lengua Y Aguas Rubias (H)	50360
Spain	Lucio De Marilópez Grande (Se)	49351
Spain	Los Pobres. Lucios De Beta La Plama (Consolidated)	49093
Spain	Caño Travieso (Se)	45357
Switzerland	Lac De Neuchâtel	105499
Switzerland	Lac Léman-Ch	72718
Tchad	Lac Fitri	137712
Tchad	Lac Tchad - Quadrat 71	68635
Tunisia	Lac Ichkeul	112030
Tunisia	Sebkha Kelbia	45052
Turkey	Uluabat Golu (Apolyont Golu)	66091
Turkey	Goksu Delta (Silifke)	58651
Turkey	Kizilirmak (Karabogaz+Balik)	58389
Turkey	Egridir Golu	56935
Turkey	Kizilirmak East (Balik)	54048
Turkey	Beysehir Golu	51890
Turkey	Camalti Salt Pans; Gediz Delta	50378
Turkey	Akyatan Golu	49258
Turkey	Meric Delta	48560
Turkey	Burdur Golu	44810
Turkey	Hirfanli Baraji	43186
Turkey	Isikli Golu [Civril Golu]	41152
Turkmenistan	Lake Sarykamysh	145214
Turkmenistan	Krasnovodsk & North-Cheleken Bays	114760
Turkmenistan	Khauzkhan Reservoir	89209
Turkmenistan	Lake Ketdeshor (Kattashor)	57412
Turkmenistan	Krasnovodsk Gulf (Convention Mar)(Turkmenbasti)	54647
Turkmenistan	Caspian Coast: Guyjuk-Okarem	46711
Turkmenistan	Kelif Floodlands (Formerly Kelif Lakes)	42225
Uganda	Lutembe Bay	151775
Ukraine	M. Sivash	155555

Table 2.9 continued

Country	Sitename	Number of birds
Ukraine	E. Sivash	150251
Ukraine	Khmelnitsk (Region)	111448
Ukraine	Dzansheisky. Shagany; Alibey; Burnas Limans	91320
Ukraine	Black Sea State Biosphere Reserve	83338
Ukraine	Sasyk Liman + Adjacent Sea Area	68240
Ukraine	Lake Kitai	67183
Ukraine	Dniestrovskiy Liman	62012
Ukraine	Stencovskie Plavny	53950
Ukraine	Crimea (Region)	53337
Ukraine	Vinitsa (Region)	44451
United Kingdom	Somerset Levels	166722
United Kingdom	Ribble Estuary	113705
United Kingdom	Loughs Neagh & Beg	91036
United Kingdom	Thames Estuary	84187
United Kingdom	Ouse Washes	71179
United Kingdom	Swale Estuary	69773
United Kingdom	Lower Derwent Ings	67193
United Kingdom	The Wash	67097
United Kingdom	Breydon Water & Berney Marshes	64222
United Kingdom	Tring Reservoirs	54883
United Kingdom	Morecambe Bay	49482
United Kingdom	Humber Estuary	47762
United Kingdom	Severn Estuary (English Counties)	45605
United Kingdom	Arun Valley	45328
United Kingdom	Mersey Estuary	43005
Uzbekistan	Kuyumasar	137385
Uzbekistan	Karakir Lakes System	83725
Uzbekistan	Tuyabuguz Reservoir	80322
Uzbekistan	Syrdarya River . Fergana Valley-Chardara Reservoir	77861
Uzbekistan	Talimardzhan Reservoir	53049
Uzbekistan	Ullishorkul Lake	41287
Serbia&Montenegro - Albania	Skadarsko Jezero	176613

2.5 Summary sites where high number of Higher Risk waterbird species mix

Figure 2.3 and Table 2.10 show sites where high numbers of "Higher Risk" species mix in January. Sites where more than 100, 250 or 500 of two or more "Higher Risk" species have been recorded during IWC counts since 1990 are shown on the map. For most species, sites are only included on the map if more than 500 birds have been counted, but for less numerous and more dispersed species, lower thresholds have been used, as follows: Mute Swan 250, Greylag Goose 250, Northern Pintail 250, Northern Shoveler 250, Gadwall 100, Black Tern 100. All sites holding two or more of these species in these numbers are shown on the map, and those holding 7 or more species in these numbers are included in the table.

Table 2.10: Sites that have held seven or more of 17 waterbird species considered to pose a High Risk of spreading Avian Influenza between 1990 and 2005 in Europe, Africa, Middle East and Central Asia All sites where seven or more species have been recorded in numbers exceeding 100, 200 or 500 (see text) are included.

Country	Sitename	Number of Species
Albania	Karavasta Complex	9
Albania	Narta Complex	8
Algeria	Lac Oubeira	10
Algeria	Marais De Mekhada	9
Algeria	Lac Fetzara	9
Algeria	Lac Tonga	8
Azerbaijan	Caspian Coast: Gyzylagach Nature Reserve	15
Azerbaijan	Kirov Bay	10
Azerbaijan	Sarysu Lake (Sarasuy)	9
Azerbaijan	Mahmudchala Lake	8
Azerbaijan	Kura River Estuary	7
Bulgaria	Atanasovo Lake Complex	11
Bulgaria	Burgas Lake (Vaya)	9
Bulgaria	Mandra Lake Complex	8
Bulgaria	Varna Lake Complex: Varnensko, Beloslavsko, Iatata Yatata	7
Bulgaria	Durankulak Lake Complex	7
Denmark	Roskilde Fjord	7
France	La Camargue	12
France	Lac De Grandlieu	10
France	Littoral Picard	9
France	Loire Aval	9
France	Dombes-Vallée De L'Ain	9
France	Cours Du Rhin (67 / 68)	9
France	Etangs De La Brenne	9
France	Etangs D'Orx	8
France	Bassin D'Arcachon	8
France	Grand Plan Du Bourg; Dont Complexe Du Vigueirat	8
France	Résèrve Naturelle De Moeze (Charente-Seudre)	8
France	Lac Du Der-Chantecoq (51 / 52)	8
France	Estuaire Seine	8
France	Presqu'Île Guérandaise Dont Traicts Du Croisic	8
France	Loire Amont	8
France	Golfe Du Morbihan	7
France	Etangs Du Nord Loire Atlantique	7
France	Lacs: Orient. Amance Et Temple-Auzon	7
Germany	Dümmer	8
Germany	Rhein: Breisach - Nonnenweier	7
Germany	Rhein: Nonnenweier-Kehl	7
Germany	Wattenmeer Sh 06	7
Germany	Wattenmeer Sh 08	7
Germany / Switzerland / Austria	Bodensee gesamt	10
Greece	Amvrakikos Wetlands	11
Greece	Evros Delta	11
Greece	Messolonghi Lagoon (From River Evinos To River Acheloos)	10
Greece	Kerkini	10
Greece	Kotychi Lagoon	9
Greece	Karla Reservoirs (Former L.Karla)	8
Greece	Vistonis (Bourou)	8
Greece	Volvi	7
Hungary	Geszt. Begecsi Halastavak	9
Hungary	Kisbalaton ‘Regi‘	8

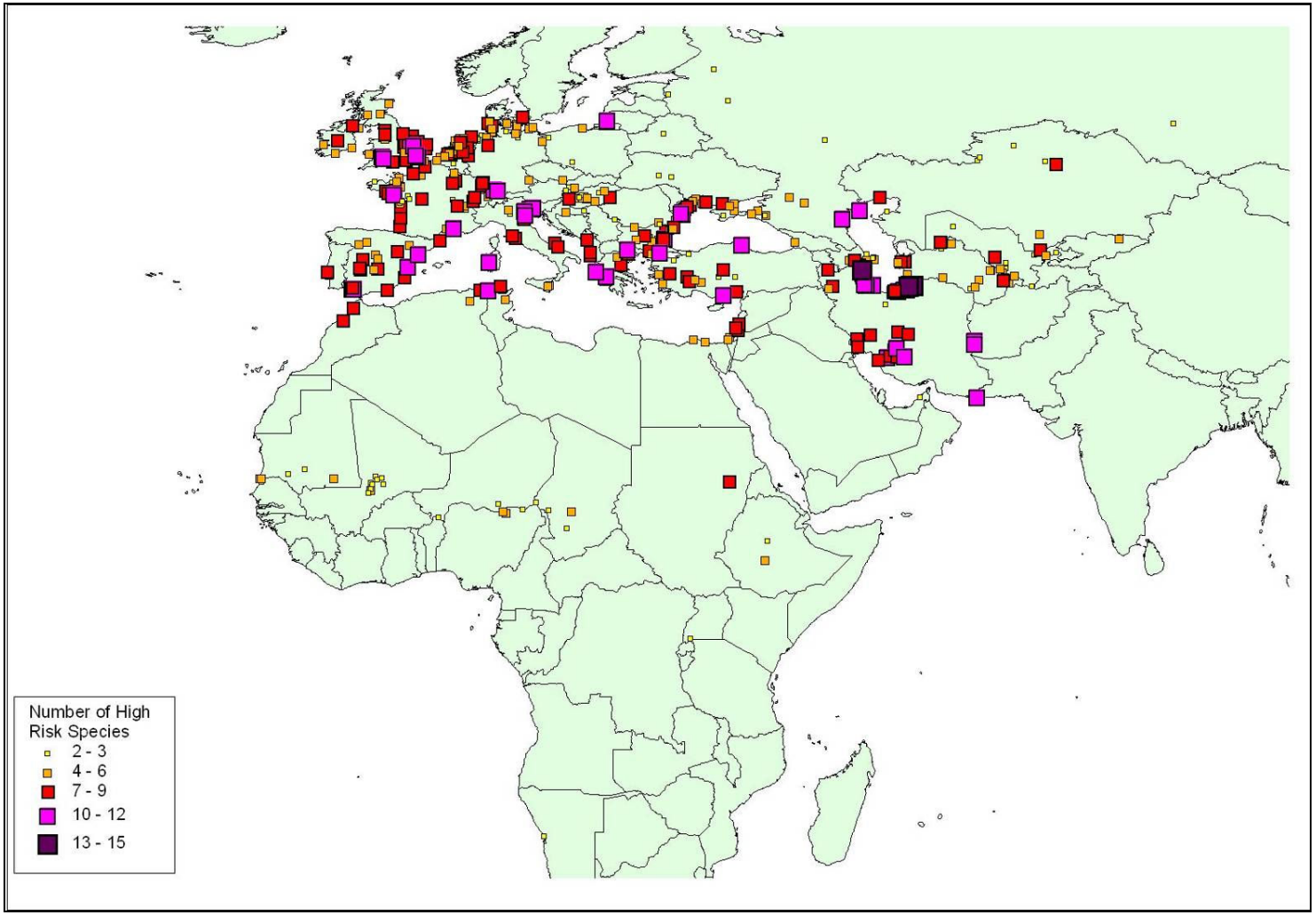


Figure 2.3: The number of 17 waterbird species considered to pose a High Risk of spreading Avian Influenza recorded at each IWC site during January counts between 1990 and 2005 in Europe, Africa, West and Central Asia.

Table 2.10 continued

Country	Sitename	Number of Species
Iran	Ala Gol Marshes: Ala Gol	13
Iran	Gomishan Marsh	13
Iran	Amirlayeh & Sheikh Ali Kol: Amirlayeh Lake	12
Iran	Anzali Mordab Complex: Anzali Marsh East	12
Iran	Miankaleh W.R. & Gorgan Bay: Miankaleh Protected Region	12
Iran	Miankaleh W.R. & Gorgan Bay: Gorgan Bay	11
Iran	Hamoun Lakes Complex: Hamoun-E-Saberi	11
Iran	Anzali Mordab Complex: Anzali Mars West (Main Lagoon)	11
Iran	Govater Bay & Hur-E-Bahu: Bahookalat River	11
Iran	Sayed Mahali & Zarinkola Ab: Zarinkola Ab-Bandan	10
Iran	Parishan Lake	10
Iran	Hamoun Lakes Complex: Kuh-I-Khajeh	10
Iran	Kaftar Lake	10
Iran	Anzali Mordab Complex: Selkeh Protected Region	10
Iran	Bakhtegan & Tashk Lakes	10
Iran	Aras River: Bralan - Aras Dam	9
Iran	Miangaran Marshes: Miangaran & Izeh Marshes	9
Iran	Anzali Mordab Complex: Sorkhankel	9
Iran	Dasht-E-Arjan Marsh	9
Iran	Maharloo Lake	9
Iran	Shadegan Marshes Protected Region: Total	9
Iran	Anzali Mordab Complex: Siakeshim Protected Region	9
Iran	Fereydoon Kenar, Ezbaran & Sorkh Rud Damgahs: Damgah Fereydoon Ke	9
Iran	Sorkhrood Damgah	8
Iran	Fereydoon Kenar, Ezbaran & Sorkh Rud Damgahs: Damgah Sorkherud	8
Iran	Lavandavil Wildlife Refuge: Lavandavil Marsh	8
Iran	Helleh River: River And Delta	8
Iran	Hamidieh Grassland	8
Iran	Gavekhoni Marsh	8
Iran	Paein Rud Posht Ab-Bandan	8
Iran	Ezbaran Damgah	8
Iran	Urmiyeh (Uromiyeh) Lake: Ghareh-Gheshlagh Marsh	7
Iran	Anar Marz Ab-Bandan	7
Iran	Dorodzan Dam	7
Iran	Caspian Coast (Gilan): Hashtpar - Anzali	7
Iran	Anzali Mordab Complex: Part Of Siahkeshim Protected Region	7
Ireland	Little Brosna Callows: Total	8
Israel	North Lower Jordan Valley	7
Israel	Hula Valley	7
Israel	Valley Of Yesreel	7
Italy	Laguna Di Venezia	12
Italy	Laguna Di Grado E Marano	11
Italy	Laguna Di Caorle E Valli Di Bibione	10
Italy	Oristano	10
Italy	Delta Del Po - Parte Veneta	10
Italy	Orbetello E Burano	9
Italy	Valli Di Comacchio E Vene Di Bellocchio	9
Italy	Maremma Grossetana	8
Italy	Pialasse E Valli Ravennati	8
Italy	Manfredonia	8
Italy	Laghi Di Lesina E Varano	7
Kazakhstan	Chardara Vdchr	8
Kazakhstan	Kurgaldjinskyi Reserve	8

Table 2.10 continued

Country	Sitename	Number of Species
Kazakhstan	North Caspian Coast total	7
Morocco	Barrage Al Massira: Settat	7
Morocco	Merja Zerga: Kenitra	7
Netherlands	Markiezaat	9
Netherlands	Biesbosch	9
Netherlands	Limburgse Maas	8
Netherlands	Gelderse / Brabantse Maas	8
Netherlands	Oosterschelde	8
Netherlands	Wolderwijd	7
Netherlands	Volkerakmeer	7
Netherlands	Veluwemeer	7
Netherlands	Groningse Noordkust	7
Netherlands	Ijssel	7
Netherlands	Ijsselmeer	7
Portugal	Estuário Do Tejo	7
Romania	Delta Dunarii (Danube Delta)	11
Romania	Island Sahalin-Melea (= Sahalin I.- Mainland)	7
Russia	Kyzlyar Bay	11
Russia	Neman River delta	10
Russia	Volga Delta	10
Spain	Lucios De Beta La Palma-Isla Mayor (Se)	11
Spain	Los Pobres. Lucios De Beta La Plama (Consolidated)	10
Spain	Caño Del Guadiamar Pnd (H)	10
Spain	Parque Natural De La Albufera (V)	10
Spain	Marisma De Hinojos (H)	10
Spain	Delta Del Ebro (T)	10
Spain	Lucio De Marilópez Grande (Se)	9
Spain	Lucios De Veta Lengua Y Aguas Rubias (H)	9
Spain	Del Palacio A La Algaida (H)	9
Spain	Lucio Del Membrillo (H)	9
Spain	Lucio De Los Ánsares (Se)	9
Spain	Parque Nacional De Doñana (Consolidation)	9
Spain	Parque Natural De El Hondo (A)	8
Spain	Caño Travieso (Se)	8
Spain	Laguna De Gallocanta (Z)	8
Spain	De La Algaida A Hato Villa (H)	8
Spain	Embalse De Castrejón (To)	7
Spain	Tablas De Daimiel (Cr)	7
Spain	Embalse De Orellana	7
Spain	Aiguamolls De L´emporda (Gi)	7
Spain	Embalse De Sierra Brava	7
Sudan	Bagga Sites	7
Switzerland	Lac De Neuchâtel	9
Switzerland	Lac Léman-Ch	7
Tunisia	Lac Ichkeul	8
Turkey	Kizilirmak (Karabogaz+Balik)	11
Turkey	Kizilirmak East (Balik)	10
Turkey	Goksu Delta (Silifke)	10
Turkey	Marmara Golu	8
Turkey	Hirfanli Baraji	8
Turkey	Akyatan Golu	8
Turkey	Isikli Golu [Civril Golu]	7
Turkey	Burdur Golu	7
Turkmenistan	Caspian Coast: Gasankuli-Guyjuk	9

Table 2.10 continued

Country	Sitename	Number of Species
Turkmenistan	Krasnovodsk Gulf (Convention Mar)(Turkmenbasti)	8
Turkmenistan	Balkhan Gulf (Convention Mar)	7
Turkmenistan	Kelif Floodlands (Formerly Kelif Lakes)	7
Turkmenistan	Lake Sarykamysh	7
Ukraine	Sasyk Liman + Adjacent Sea Area	8
Ukraine	E. Sivash	8
Ukraine	Secondary Delta Of The Kiliya Channel (Danube)	7
Ukraine	Budaksky + Gribovsky Limans	7
Ukraine	Black Sea State Biosphere Reserve	7
Ukraine	Dzansheisky. Shagany; Alibey; Burnas Limans	7
United Kingdom	Severn Estuary (English Counties)	12
United Kingdom	Thames Estuary	12
United Kingdom	Somerset Levels	11
United Kingdom	Nene Washes	10
United Kingdom	Swale Estuary	10
United Kingdom	Ouse Washes	10
United Kingdom	Rutland Water	9
United Kingdom	North Norfolk Coast	9
United Kingdom	Morecambe Bay	9
United Kingdom	Lower Derwent Ings	9
United Kingdom	Loughs Neagh & Beg	9
United Kingdom	Pitsford Reservoir	8
United Kingdom	WWT Martin Mere	8
United Kingdom	Poole Harbour	8
United Kingdom	Arun Valley	8
United Kingdom	Humber Estuary	8
United Kingdom	Breydon Water & Berney Marshes	8
United Kingdom	Abberton Reservoir	7
United Kingdom	Medway Estuary	7
United Kingdom	Alde Complex	7
United Kingdom	The Wash	7
United Kingdom	Ribble Estuary	7
Uzbekistan	Karakir Lakes System	7
Serbia&Montenegro - Albania	Skadarsko Jezero	9

2.6 Combined data: sites important for large numbers of birds and a high variety of species

Analyses of sites important for large numbers of waterbirds in winter (2.3, 2.4), and those important for a wide variety of species (2.5) resulted in rather different lists of important sites. An analysis was therefore undertaken where these two factors (numbers and diversity) were combined. Figure 2.4 and Table 2.11 include sites where two or more of the 17 Higher Risk waterbird species have been counted in numbers exceeding certain thresholds between 1990 and 2005. For most species, the threshold above which sites were included on the map was set at 500, but for less numerous and widespread species lower thresholds were used, as follows; 250 for Mute Swan, Greylag Goose, Gadwall, Northern Pintail, Northern Shoveler, and 100 for Black Tern. These are the same thresholds used to identify important sites for each species in the species accounts which

follow. Selection on this basis produced a list of sites, which are shown in Figure 2.4. Table 2.11 includes all 487 such sites where more than 20,000 waterbirds of two or more species have been counted in these numbers. This table provides a good starting point for compilation of a definitive list of sites posing a High Risk of transmission of HPAI in the event of outbreaks among wild birds.

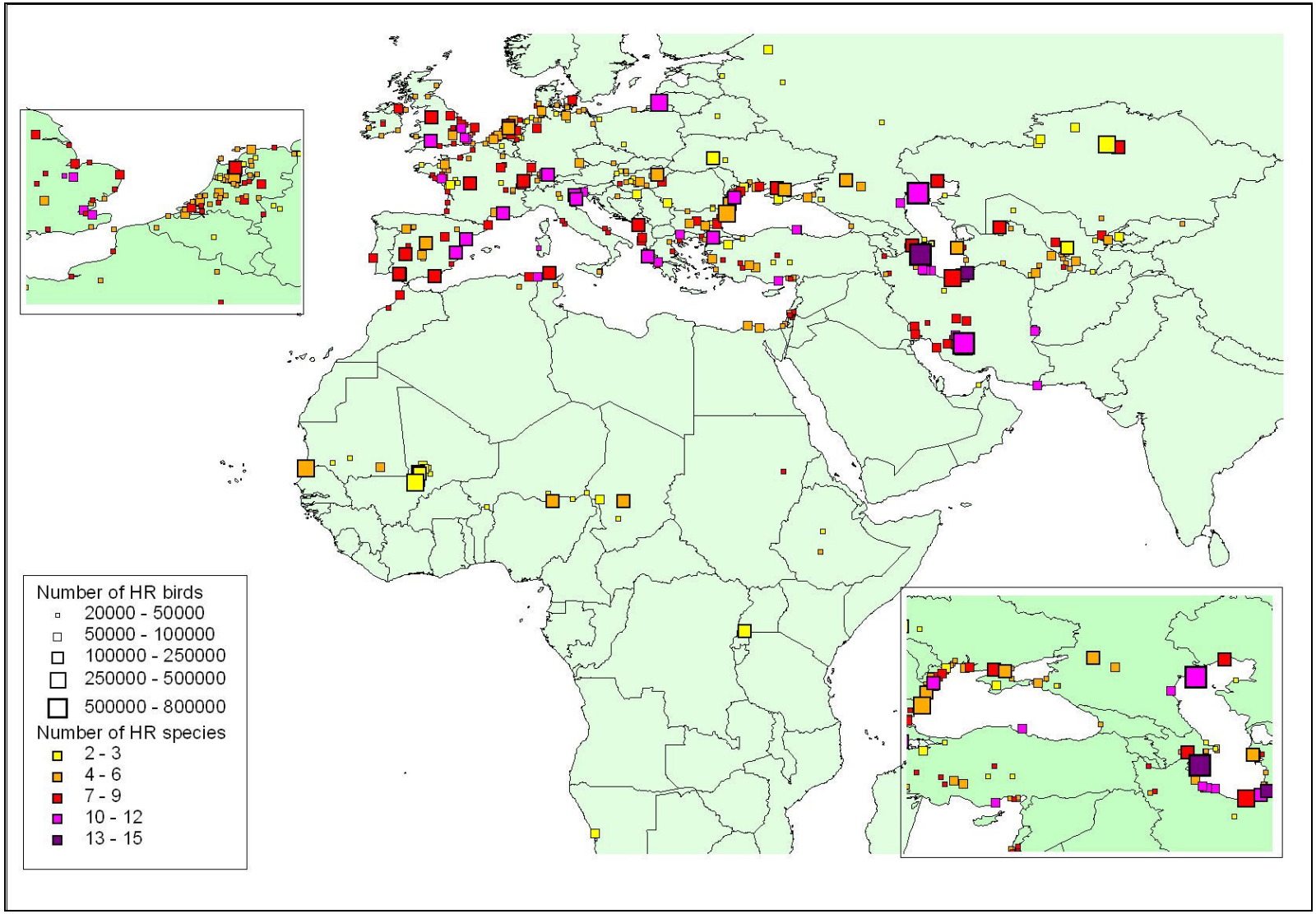


Figure 2.4: All sites where combined counts of "Higher Risk" waterbird species exceeded 20,000 between 1990 and 2005, and where two or more of these species occurred in numbers exceeding thresholds of 100, 250 or 500, (depending on species – see text).

Table 2.11: All sites where combined counts of "Higher Risk" waterbird species exceeded 20,000, between 1990 and 2005, and where two or more of these species occurred in numbers exceeding certain thresholds (see text).

Country	Sitename	Number of Birds	Number Species
Albania	Karavasta Complex	84647	9
Albania	Narta Complex	50528	8
Algeria	Lac Oubeira	65279	10
Algeria	Lac Fetzara	54786	9
Algeria	Marais De Mekhada	48815	9
Algeria	Lac Tonga	35281	8
Algeria	Sebkhet Djendli	22000	5
Austria	Neusiedlersee. Seewinkel; Hansag	44110	3
Azerbaijan	Caspian Coast: Gyzylagach Nature Reserve	793392	15
Azerbaijan	Kirov Bay	282140	10
Azerbaijan	Sarysu Lake (Sarasuy)	127599	9
Azerbaijan	Mahmud-Chala Lake (Third Chala)	42105	7
Azerbaijan	Mahmudchala Lake	28042	8
Azerbaijan	Kura River Estuary	27986	7
Azerbaijan	Caspian Coast: Factory Shelf	27845	4
Azerbaijan	Caspian Coast: Yashma Is. and Gilazy Spit	27828	3
Azerbaijan	Aggel (Ah Gol) Lake	26954	6
Azerbaijan	Caspian Coast: Alyat Bay	26905	4
Azerbaijan	Caspian Coast: Sangachal Bay	26691	2
Azerbaijan	Shah Cape (Apsheron Archipelago Tara Islands)	25306	2
Azerbaijan	Caspian Coast: Pyrallahy Island	21385	3
Azerbaijan	Caspian Coast: Shakdilli Spit	20945	5
Belgium	Spaarbekken Merkem	34069	4
Belgium	Achterhaven Zeebrugge	33342	5
Bulgaria	Shabla Lake Complex	314814	6
Bulgaria	Shabla Lake (+ Ezeretz)	268195	5
Bulgaria	Durankulak Lake Complex	179660	7
Bulgaria	Burgas Lake (Vaya)	92662	9
Bulgaria	Mandra Lake Complex	90486	8
Bulgaria	Piasachnik Reservoir	76085	5
Bulgaria	Ovcharitza	51336	6
Bulgaria	Srebarna Lake	47057	3
Bulgaria	Black Sea Coast: Kavarna-Balchik-Kranevo	40126	5
Bulgaria	Atanasovo Lake Complex	38290	11
Bulgaria	Tzerkovski Tserkovski Reservoir	33180	3
Bulgaria	Danube: Tutrakan-Silistra Toutrakan – Silistra	30940	5
Bulgaria	Danube: Other Sites	30509	6
Bulgaria	Zrebchevo Zhrebchevo Reservoir	25832	5
Bulgaria	Small Natural Or Artificial Lenthic Wetlands In North Bulgaria	22051	3
Bulgaria	Varna Lake Complex: Varnensko, Beloslavsko, Iatata Yatata	20878	7
Croatia	Kopacki Rit	53256	2
Croatia	Park Prirode Lonjsko Polje (Lonjsko Polje Nature Park)	24869	4
Czech	Nove Mlyny I & Iidam Systems	25052	4
Denmark	Roskilde Fjord	70942	7
Denmark	Danish Wadden Sea	45821	6
Denmark	Sydfynske Hav	36939	6
Denmark	Maribo Soerne	36296	4
Denmark	Lolland NW	33787	5
Egypt	Lake Manzala	83643	5
Egypt	Lake Burullus	59365	6
Ethiopia	Abijata-Shalla Lakes National Park	37290	2

Table 2.11 continued

Country	Sitename	Number of Birds	Number Species
Ethiopia	Lake Abijatta	31499	5
France	La Camargue	196404	12
France	Etangs De La Brenne	102220	9
France	Cours Du Rhin (67 / 68)	88987	9
France	Etangs Montpellierains (34+30)	86780	6
France	Etangs Et Lacs Du Bocage Vendéen	76987	3
France	Baie Du Mont Saint Michel	71338	6
France	Lac De Grandlieu	63935	10
France	Lacs: Orient. Amance Et Temple-Auzon	56523	7
France	Loire Amont	54380	8
France	Presqu'Île Guérandaise Dont Traicts Du Croisic	48170	8
France	Estuaire Seine	43154	8
France	Marais Poitevin	42495	2
France	Lac Du Der-Chantecoq (51 / 52)	41587	8
France	Etangs Du Nord Loire Atlantique	41313	7
France	Dombes-Vallée De L'Ain	40749	9
France	Baie De Morlaix + Penze	40349	3
France	Loire Aval	38139	9
France	Baie De L'Aiguillon Et Pointe D'Arcay	34903	6
France	Complexe De L'Etang De Berre	34424	4
France	Résèrve Naturelle De Moeze (Charente-Seudre)	33570	8
France	Etang De Châtillon En Vendelais	31640	4
France	Grand Plan Du Bourg; Dont Complexe Du Vigueirat	31342	8
France	Sud-Loire	30966	4
France	Rétenue Du Cebron	29753	3
France	Bassin Du Leman (Lac Léman+Rhône+Plans D'Eau Annexes)	28105	3
France	Etangs Dans Region Argenton-Château	27616	3
France	Golfe Du Morbihan	25768	7
France	Littoral Du Pas De Calais	24174	5
France	Haut Rhône (01 / 73 / 74)	24053	6
France	Résèrve Naturelle De St. Denis Du Payre	23260	6
France	Littoral Picard	22097	9
France	Rance	21861	3
France	Bassin D'Arcachon	21494	8
France	Etang De Paintourteau	21362	4
France	Etangs De La Region Centre	20869	3
France	Lac Du Bourget	20857	4
France	Etangs Du Montmorillonnais (4)	20686	3
France	Val De Seine De Vernon À Pont De L'Arche	20274	5
France	Etangs D'Orx	20016	8
Georgia	Paliastomi Lake	44470	4
Germ./Switz./Austr.	Bodensee gesamt	180311	10
Germany	Dümmer	61665	8
Germany	Wismar-Hohen Wieschendorfer Huk	58893	5
Germany	Wattenmeer Sh 10	51301	6
Germany	Donau: Km 2246-2405	50984	4
Germany	Wattenmeer Sh 08	42005	7
Germany	Rheiderland	37275	2
Germany	Vorland Jadebusen	36704	4
Germany	Wattenmeer Sh 12	36347	6
Germany	Bislicher Insel	35971	2
Germany	Seehof-Wittower Fähre-Breetzer Bodden	33011	4
Germany	Fischteiche Der Lewitz	31462	2
Germany	Wattenmeer Sh 06	31382	7

Table 2.11 continued

Country	Sitename	Number of Birds	Number Species
Germany	Rhein: Nonnenweier-Kehl	28041	7
Germany	Großer Plöner See	27715	3
Germany	Rhein: Breisach – Nonnenweier	27324	7
Germany	Wendisch Langendorf-Barth	25961	5
Germany	Wattenmeer Sh 11	25693	4
Germany	Weser: Strohauser Plate	24923	5
Germany	Neuharlingersiel – Carolinensiel	24855	3
Germany	Wattenmeer Sh 13	24155	4
Germany	Salzhaff	23761	5
Germany	Oder (Stützkow/Piasek-Alte Oder Zaton/Schwedt)	22272	4
Germany	Rhein: Weil-Breisach	21461	6
Germany	Walsumer Rheinaue	20730	2
Germany	Rassower Strom Und Wieker Bodden	20336	4
Greece	Evros Delta	248525	11
Greece	Amvrakikos Wetlands	156101	11
Greece	Kerkini	98073	10
Greece	Messolonghi Lagoon (From River Evinos To River Acheloos)	51994	10
Greece	Axios, Loudias & Aliakmon Deltas	42272	6
Greece	Vistonis (Bourou)	38730	8
Greece	Volvi	31882	7
Greece	Karla Reservoirs (Former L.Karla)	27981	8
Greece	Porto Lagos (Lagos And Coast)	20961	6
Greece	Kotychi Lagoon	20520	9
Hungary	Hortobagy Halasto	163543	6
Hungary	Geszt. Begecsi Halastavak	58875	9
Hungary	Szabadszallas Szikes To = Kisret. Zabszek Knp	50893	5
Hungary	Fulupszallas Szikes To = Kelemenszek Knp	39308	6
Hungary	Kisbalaton 'Regi'	36008	8
Hungary	Soponyai-Halastavak	34713	3
Hungary	Balaton: Total	31696	5
Hungary	Velencei To	30761	3
Hungary	Retszilas Halasto	30346	5
Hungary	Biharugrai Halasto	30089	5
Hungary	Duna: 1791-1794 Fkm Gonyu	29342	3
Hungary	Dinnyes Ferto	25358	5
Hungary	Tac (Sarviz)	23244	3
Hungary	Csaj. Pusztaszer (Halasto) = Tomorkeny	23004	6
Hungary	Duna 2: Baja-Dunafoldvar	22327	3
Hungary	Fertó Tó (Lake Fertó)	20087	2
Iran	Bakhtegan & Tashk Lakes	639096	10
Iran	Fereydoon Kenar, Ezbaran & Sorkh Rud Damgahs:	407332	9
Iran	Gomishan Marsh	168520	13
Iran	Miankaleh W.R. & Gorgan Bay: Miankaleh Protected Region	131157	12
Iran	Ezbaran Damgah	126350	8
Iran	Govater Bay & Hur-E-Bahu: Bahookalat River	96688	11
Iran	Paein Rud Posht Ab-Bandan	95710	8
Iran	Anzali Mordab Complex: Anzali Mars West (Main Lagoon)	87376	11
Iran	Anzali Mordab Complex: Anzali Marsh East	84715	12
Iran	Anzali Mordab Complex: Siakeshim Protected Region	84180	9
Iran	Shadegan Marshes Protected Region: Total	82163	9
Iran	Anzali Mordab Complex: Selkeh Protected Region	76406	10
Iran	Gavekhoni Marsh	75259	8

Table 2.11 continued

Country	Sitename	Number of Birds	Number Species
Iran	Kaftar Lake	72920	10
Iran	Hamidieh Grassland	62368	8
Iran	Maharloo Lake	60594	9
Iran	Dasht-E-Arjan Marsh	59699	9
Iran	Amirlayeh & Sheikh Ali Kol: Amirlayeh Lake	59581	12
Iran	Hamoun Lakes Complex: Kuh-I-Khajeh	56807	10
Iran	Helleh River: River And Delta	56554	8
Iran	Anzali Mordab Complex: Sorkhankel	55154	9
Iran	Chookam Ab-Bandan	54565	6
Iran	Anzali Mordab Complex: Part Of Siahkeshim Protected Region	53322	7
Iran	Caspian Coast (Gilan): Anzali- Astara	50718	5
Iran	Miangaran Marshes: Miangaran & Izeh Marshes	45112	9
Iran	Hamoun Lakes Complex: Hamoun-E-Saberi	44847	11
Iran	Caspian Coast (Gilan): Astara – Hashtpar	40736	6
Iran	Lavandavil Wildlife Refuge: Lavandavil Marsh	39600	8
Iran	Aras River: Bralan - Aras Dam	36906	9
Iran	Fereydoon Kenar, Ezbaran & Sorkh Rud Damgahs: Damgah Sorkherud	36497	8
Iran	Miankaleh W.R. & Gorgan Bay: Gorgan Bay	30914	11
Iran	Urmiyeh (Uromiyeh) Lake:: Total	30478	5
Iran	Parishan Lake	30082	10
Iran	Caspian Coast (Gilan): Anzali – Langarud	29248	6
Iran	Ala Gol Marshes: Ala Gol	25846	13
Iran	Sayed Mahali & Zarinkola Ab: Zarinkola Ab-Bandan	25730	10
Iran	Caspian Coast (Gilan): Hashtpar – Anzali	25376	7
Iran	Sorkhrood Damgah	23605	8
Iran	Dorodzan Dam	22409	7
Iran	Pain Rudposht Ab-Bandan	22117	4
Iran	Varamin Lake	21288	3
Iran	Anar Marz Ab-Bandan	20915	7
Iran	Urmiyeh (Uromiyeh) Lake: Ghareh-Gheshlagh Marsh	20662	7
Ireland	Shannon And Fergus Estuary Ground	36024	5
Ireland	Wexford Harbour And Slobs	35739	6
Ireland	Little Brosna Callows	31456	8
Ireland	Cork Harbour	22276	5
Ireland	Shannon Callows	20632	4
Israel	Southern Coastal Plain	48207	5
Israel	Valley Of Yesreel	39857	7
Israel	Hula Valley	39766	7
Israel	North Lower Jordan Valley	24908	7
Israel	Galilee Coastal Plain	23833	6
Israel	Southern Coastal Plain	21477	5
Israel	Hula Valley	20418	7
Israel	Kinnrot Valley	20233	6
Italy	Delta Del Po - Parte Veneta	135783	10
Italy	Laguna Di Venezia	132222	12
Italy	Laguna Di Grado E Marano	66486	11
Italy	Oristano	44758	10
Italy	Manfredonia	41636	8
Italy	Laguna Di Caorle E Valli Di Bibione	37405	10
Italy	Biviere Di Lentini	34486	5
Italy	Lago Di Garda	32962	5
Italy	Pialasse E Valli Ravennati	31464	8
Italy	Laghi Di Mantova	29542	3

Table 2.11 continued

Country	Sitename	Number of Birds	Number Species
Italy	Maremma Grossetana	27087	8
Italy	Valli Di Comacchio E Vene Di Bellocchio	25847	9
Italy	Orbetello E Burano	24619	9
Italy	Foce Simeto	24000	5
Italy	Baia Di Panzano	22743	6
Italy	Laghi Di Lesina E Varano	22170	7
Kazakhstan	Small lakes north of Kurgaljin NR	451300	2
Kazakhstan	North Caspian Coast total	179493	7
Kazakhstan	Kurgaldjinskyi Reserve	118288	8
Kazakhstan	Kulykol Lake, Kustanay reg.	83800	3
Kazakhstan	Ayke Lake, Kustanay reg.	58700	3
Kazakhstan	Koybagar & Tyuntyugur Lakes, Kustanay reg.	58080	3
Kazakhstan	Chardara Vdchr	51090	8
Kazakhstan	Chuchkakol Lakes	48901	4
Kazakhstan	Caspian Coast. O-Va Durneva-Turmenia Border	34000	3
Kazakhstan	Small lakes west of Kurgaljin NR	31000	3
Kyrgyzstan	Issyk-Kul Lake: Total	42074	6
Mali	Delta Quad'S 101,102,107-110,115-117,125	356085	2
Mali	Delta Quad 46	194015	2
Mali	Delta Quad 33	165000	2
Mali	Delta Quad 84	135000	2
Mali	Delta Quad 93 (Walado Debo)	112457	4
Mali	Delta Quad 20	95000	2
Mali	Delta Quad 8	65200	2
Mali	Delta Quad 74	45890	3
Mali	Delta Quad 75	43000	2
Mali	Delta Quad 18	32625	2
Mali	Delta Quad 53	29000	2
Mali	Delta Quad 45	23500	2
Mauritanie	Mahmouda	77087	5
Mauritanie	Diawling	65716	5
Mauritanie	Lac De Mal	32746	3
Mauritanie	Bassin De R'Kiz	31647	2
Morocco	Merja Zerga: Kenitra	50601	7
Morocco	Barrage Al Massira: Settat	26603	7
Namibia	Walvis Bay Ramsar Site	61444	2
Netherlands	Markermeer	137376	6
Netherlands	Ijsselmeer	104666	7
Netherlands	Westerschelde	96187	6
Netherlands	Friese Noordkust	68610	5
Netherlands	Haringvliet	64524	5
Netherlands	Oosterschelde	64038	8
Netherlands	Gelderse / Brabantse Maas	60713	8
Netherlands	Ijssel	56336	7
Netherlands	Reeuwijkse Plassen E.O.	54543	4
Netherlands	Sneekermeer E.O.	49573	5
Netherlands	Limburgse Maas	48839	8
Netherlands	Biesbosch	47077	9
Netherlands	Krimpenerwaard	46721	5
Netherlands	Eemmeer. Nijkerkernauw En Nuldernauw	46435	5
Netherlands	Groningse Noordkust	43065	7
Netherlands	Lek	42652	4
Netherlands	Polder Zeevang	41530	5
Netherlands	Gooimeer	39498	5

Table 2.11 continued

Country	Sitename	Number of Birds	Number Species
Netherlands	Grevelingen	39088	5
Netherlands	Texel	38748	5
Netherlands	Waterland	37720	6
Netherlands	Waal	37411	5
Netherlands	Veluwemeer	35139	7
Netherlands	Oude Venen	34350	3
Netherlands	Volkerakmeer	34128	7
Netherlands	Alkmaardermeer E.O.	31666	4
Netherlands	Oostzaanse Polders En Het Ilperveld	30683	4
Netherlands	Wolderwijd	30378	7
Netherlands	Hollands Diep	28856	5
Netherlands	Veerse Meer	28021	4
Netherlands	Tjeukemeer	27886	6
Netherlands	Midden-Delfland En Oude-Leede	27119	5
Netherlands	Alblasserwaard	26588	5
Netherlands	Fluessen En Heegermeer	26425	3
Netherlands	Markiezaat	26281	9
Netherlands	Gelderse Poort	25531	6
Netherlands	Ketelmeer	25187	6
Netherlands	Dollard	24701	4
Netherlands	Nieuwe Waterweg / Calandkanaal	24043	6
Netherlands	Zwarte Meer	24031	6
Netherlands	Terschelling	23874	5
Netherlands	Eilandspolder	22041	3
Netherlands	Nederrijn	21958	6
Netherlands	Wormer- En Jisperveld	20092	2
Niger	Gouske	30312	3
Niger	Complexe "Tam"	21326	2
Niger	Chiya	20612	2
Nigeria	Hadejia-Nguru, All Quadrats	187298	5
Nigeria	Hadejia-Nguru Wetland, Quad 13	31138	4
Poland	Jez. Dabie	37607	3
Poland	Zat. Gdanska	33192	4
Poland	Odra: Krzepkowice-Brzeg Dolny (160 Km)	25331	3
Portugal	Estuário Do Tejo	57573	7
Portugal	Estuário Do Sado	32166	6
Romania	Delta Dunarii (Danube Delta)	146432	11
Romania	Chituc (Vadu-Periboina)	127571	4
Romania	Lake Sinoe (= Sinoie)	116116	6
Romania	Golovita (Bisericuta-Gr. Lupilor)	79260	5
Romania	Portile De Fier Reservoir (Romanian Part)	67583	3
Romania	Razelm Nw	52420	5
Romania	Lakes Nuntasi And Tuzla	43631	3
Romania	Periteasca-Portita (244402911 + 244402912)	29911	4
Romania	Techirghiol	28862	4
Romania	Lake Razelm	24405	5
Romania	Island Sahalin-Melea (= Sahalin I.- Mainland)	24271	7
Romania	Gr. Buhazu (Vadu)	22708	3
Romania	Razelm Ne	22160	6
Romania	Gura Portitei-Gr.Periboina	21425	3
Russia	West Siberia	980000	3
Russia	Volga Delta	516562	10
Russia	Veselovskoye Reservoir	249200	5

Table 2.11 continued

Country	Sitename	Number of Birds	Number Species
Russia	Olonets Plain	82700	2
Russia	Lake Manych-Gudilo	71662	4
Russia	Kiziltashsky Liman Complex	65589	6
Russia	Kyzlyar Bay	63230	11
Russia	Penza Region	44000	3
Russia	Kryukovskoye Reservoir	40892	2
Russia	Wetlands of Upper Volga, Tver region	40340	3
Russia	Group of limans between the Kuban and Protoka	32958	5
Russia	Varnavinskoye Reservoir	30137	4
Russia	Pskovsko-Chudskaya Lowland	28000	2
Russia	Kuban Delta	27240	6
Senegal	Parc National Des Oiseaux Du Djoudj	457946	4
Senegal	Les Trois Marigots	36853	3
Slovakia	Podunaji (Danube Floodplain)	41393	5
Slovakia	Hrušov Dam From Dunaj'S Mouth To Cunovo	22358	3
Spain	Parque Nacional De Doñana (Consolidation)	203001	9
Spain	Lucios De Beta La Palma-Isla Mayor (Se)	126941	11
Spain	Delta Del Ebro (T)	126310	10
Spain	Marisma De Hinojos (H)	118874	10
Spain	Parque Natural De La Albufera (V)	118844	10
Spain	Gravera Del Porcal (M)	105756	4
Spain	De La Algaida A Hato Villa (H)	104965	8
Spain	Lucio De Los Ánsares (Se)	101949	9
Spain	Embalse De Sierra Brava	100173	7
Spain	Caño Del Guadiamar Pnd (H)	89738	10
Spain	Laguna De Gallocanta (Z)	65871	8
Spain	Lucio Del Membrillo (H)	61613	9
Spain	Embalse De El Vicario (Cr)	58726	4
Spain	Aiguamolls De L´emporda (Gi)	56259	7
Spain	Del Palacio A La Algaida (H)	54969	9
Spain	Lagunas De Villafáfila (Za)	53402	6
Spain	Lucios De Veta Lengua Y Aguas Rubias (H)	50360	9
Spain	Lucio De Marilópez Grande (Se)	49351	9
Spain	Los Pobres. Lucios De Beta La Plama (Consolidated)	49093	10
Spain	Caño Travieso (Se)	45357	8
Spain	Embalse De Orellana	38280	7
Spain	Parque Natural De El Hondo (A)	36637	8
Spain	Lucios Del Caballero Y Del Puntal (H)	32581	6
Spain	Embalse De Santillana (M)	30369	5
Spain	Laguna De Sariñena (Hu)	27202	6
Spain	Tablas De Daimiel (Cr)	26727	7
Spain	Embalse Vega Del Jabalón (Cr)	22924	2
Spain	Laguna De La Nava De Fuentes	22876	5
Spain	Laguna De Boada	20251	3
Spain	Embalse De Castrejón (To)	20108	7
Sudan	Bagga Sites	22657	7
Switzerland	Lac De Neuchâtel	105499	9
Switzerland	Lac Léman-Ch	72718	7
Switzerland	Vierwaldstättersee	33179	5
Switzerland	Bodensee-Obersee-Ch	30439	6
Switzerland	Zürichsee	24301	6
Switzerland	Hochrhein: Rheinklingen-Aaremündung	20224	6
Switzerland	Bielersee	20147	4
Tchad	Lac Fitri	137712	4

Table 2.11 continued

Country	Sitename	Number of Birds	Number Species
Tchad	Lac Tchad - Quadrat 71	68635	2
Tchad	Lac Tchad - Quadrat 17	39385	2
Tchad	Bas Chari (Tchad)	36517	3
Tunisia	Lac Ichkeul	112030	8
Tunisia	Sebkha Kelbia	45052	5
Tunisia	Lac De Bizerte	34532	5
Tunisia	Garaet Mabtouha	24647	5
Turkey	Uluabat Golu (Apolyont Golu)	66091	3
Turkey	Goksu Delta (Silifke)	58651	10
Turkey	Kizilirmak (Karabogaz+Balik)	58389	11
Turkey	Egridir Golu	56935	5
Turkey	Kizilirmak East (Balik)	54048	10
Turkey	Beysehir Golu	51890	4
Turkey	Camalti Salt Pans; Gediz Delta	50378	6
Turkey	Akyatan Golu	49258	8
Turkey	Meric Delta	48560	5
Turkey	Burdur Golu	44810	7
Turkey	Hirfanli Baraji	43186	8
Turkey	Isikli Golu [Civril Golu]	41152	7
Turkey	Bafa Golu	36558	6
Turkey	Yumurtalik Lagoons(Yapi+Omerg)	35828	6
Turkey	Marmara Golu	29895	8
Turkey	Sultansazligi(Yay+Col+Kurbaga)	26752	3
Turkey	Esmekaya Golu	25723	3
Turkey	Tuzla Golu (Ceyhan Delta)	23021	5
Turkey	Akyayan Golu	22140	5
Turkey	Sapanca Golu	21726	3
Turkmenistan	Lake Sarykamysh	145214	7
Turkmenistan	Krasnovodsk & North-Cheleken Bays	114760	5
Turkmenistan	Khauzkhan Reservoir	89209	5
Turkmenistan	Lake Ketdeshor (Kattashor)	57412	6
Turkmenistan	Krasnovodsk Gulf (Convention Mar)(Turkmenbasti)	54647	8
Turkmenistan	Caspian Coast: Guyjuk-Okarem	46711	5
Turkmenistan	Kelif Floodlands (Formerly Kelif Lakes)	42225	7
Turkmenistan	Balkhan Gulf (Convention Mar)	39480	7
Turkmenistan	Tedzhen (Tejen) Reservoir 2	39362	2
Turkmenistan	Lake Romankuldogajik (30Km W. Of Kattashor)	38771	5
Turkmenistan	Kopetdag Reservoir	35717	5
Turkmenistan	Amudarya Valley: Kerki-Karabekaul	34849	4
Turkmenistan	Soltandzhar Reservoir	33972	6
Turkmenistan	Lake Dengizkul	32884	6
Turkmenistan	Zeid Reservoir	32049	6
Turkmenistan	Lake Soltantagt	31041	5
Turkmenistan	Caspian Coast: Gasankuli-Guyjuk	29893	9
Turkmenistan	Lake Kernai (Aybugir)	27490	3
Turkmenistan	Dzharsai River Floodplains (Jarsay Collector)	24962	6
Turkmenistan	Caspian Coast: Okarem-Cheleken	23635	4
Turkmenistan	Caspian Coast: Chikishlyar Shore	20278	5
U.A.E.	Khor Dubai	21035	3
Uganda	Lutembe Bay	151775	2
Ukraine	M. Sivash	155555	6
Ukraine	E. Sivash	150251	8
Ukraine	Khmelnitsk (Region)	111448	2
Ukraine	Dzansheisky. Shagany; Alibey; Burnas Limans	91320	7

Table 2.11 continued

Country	Sitename	Number of Birds	Number Species
Ukraine	Black Sea State Biosphere Reserve	83338	7
Ukraine	Sasyk Liman + Adjacent Sea Area	68240	8
Ukraine	Lake Kitai	67183	6
Ukraine	Dniestrovskiy Liman	62012	2
Ukraine	Stencovskie Plavny	53950	6
Ukraine	Crimea (Region)	53337	3
Ukraine	Vinitsa (Region)	44451	2
Ukraine	Odessa (Region)	35854	4
Ukraine	Utl'Ukskij Liman	35291	6
Ukraine	Danube Delta	34921	6
Ukraine	Tiligulsky Liman	33950	6
Ukraine	W. Sivash	32563	4
Ukraine	Budaksky + Gribovsky Limans	31430	7
Ukraine	Secondary Delta Of The Kiliya Channel (Danube)	30785	7
Ukraine	Gebriianov Bay	27900	5
Ukraine	Dnester Delta + Liman	25839	6
Ukraine	Area Northeast Of Odessa	23190	5
United Kingdom	Somerset Levels	166722	11
United Kingdom	Ribble Estuary	113705	7
United Kingdom	Loughs Neagh & Beg	91036	9
United Kingdom	Thames Estuary	84187	12
United Kingdom	Ouse Washes	71179	10
United Kingdom	Swale Estuary	69773	10
United Kingdom	Lower Derwent Ings	67193	9
United Kingdom	The Wash	67097	7
United Kingdom	Breydon Water & Berney Marshes	64222	8
United Kingdom	Tring Reservoirs	54883	5
United Kingdom	Morecambe Bay	49482	9
United Kingdom	Humber Estuary	47762	8
United Kingdom	Severn Estuary (English Counties)	45605	12
United Kingdom	Arun Valley	45328	8
United Kingdom	Mersey Estuary	43005	5
United Kingdom	North Norfolk Coast	38664	9
United Kingdom	Blackwater Estuary	33588	6
United Kingdom	Forth Estuary	32671	6
United Kingdom	Nene Washes	31461	10
United Kingdom	Hamford Water And Naze Combined	31401	6
United Kingdom	Walland Marsh	31177	4
United Kingdom	Alde Complex	30017	7
United Kingdom	Poole Harbour	28211	8
United Kingdom	Rutland Water	26885	9
United Kingdom	Loch Of Skene	24870	4
United Kingdom	Medway Estuary	24472	7
United Kingdom	Strangford Lough	23648	6
United Kingdom	Inner Firth Of Clyde	23557	5
United Kingdom	WWT Martin Mere	23484	8
United Kingdom	Abberton Reservoir	22704	7
United Kingdom	Carmarthen Bay	20485	4
United Kingdom	Pitsford Reservoir	20407	8
Uzbekistan	Kuyumasar	137385	2
Uzbekistan	Karakir Lakes System	83725	7
Uzbekistan	Tuyabuguz Reservoir	80322	2
Uzbekistan	Syrdarya River . Fergana Valley-Chardara Reservoir	77861	5
Uzbekistan	Talimardzhan Reservoir	53049	4

Table 2.11 continued

Country	Sitename	Number of Birds	Number Species
Uzbekistan	Ullishorkul Lake	41287	2
Uzbekistan	Amudarya River (High Part Of The Stream)	33936	3
Uzbekistan	Zekry Lake	23658	2
Uzbekistan	Achinskoe Lake	23069	3
Serbia&Montenegro - Albania	Skadarsko Jezero	176613	9

2.7 Species Accounts

For this preliminary analysis, 17 Higher Risk waterbird species were selected as described above. For each of these species, the January count data held in the IWC database were queried, and additional information on sites important for breeding, moulting and wintering were compiled from the Russian literature and added to the dataset (for more details, see the Introduction and Table 2.1). These data are summarized on maps and important sites for each species are presented in tables. The tables include columns for country, site name, peak count and year of peak count. These are followed by a "type" column indicating the type of count by codes, as follows: J: January count; M: Count of moulting concentration; S: count at a staging area on migration; B: Count at breeding site. The Reference column in the tables gives a reference number for the source of information, as listed in Table 2.1

The second section of each species account gives details about the migration patterns of the species, based on ring recovery data, and the following Introduction gives information necessary for the correct interpretation of the migration data.

2.7.1 Waterbird movements

The second section of each of the Species Accounts gives information on the movements of these 17 species of waterbird considered to be at risk of contracting and spreading Avian Influenza (AI) by migratory movements. For each species, the following information is presented:

- An overview of the migratory movements
- A summary map showing the movements of each species. These maps are based on published information that has been interpreted by ornithological experts and therefore give an impression of the movements of birds.
- A table providing details of migratory movements gathered from the literature and ringing recoveries.
- A map of the areas with the highest wintering concentrations of each species
- Dot maps giving finding locations (recoveries) of birds ringed in Europe, accompanied by maps giving sample sizes (see below).
- A set of maps for each species from country atlases either published or in preparation to provide further background information, which is provided in Annex 2.2.

The information presented in the dot maps of finding locations is based on reports of ringed birds (recoveries). The data have been generated by ringing schemes throughout Europe, and are held in the EURING databank (EDB), currently hosted by the British Trust for Ornithology (www.euring.org). Ringing schemes throughout Europe have both volunteer and professional ringers who have generated these data. The data are submitted to the EURING databank to provide a single access point for recovery information for Europe.

2.7.1.1 Biases in the collation of ring recovery data

The dot maps provide a straightforward method of describing the distribution of a species and thus providing information about their movements. Finding locations are presented for each species. An initial map shows all recoveries and is followed by monthly maps to show the distribution of that species throughout the year. For Red-breasted Goose there are only four recoveries and these are presented on one map that shows the location and the month of finding.

The different types of recoveries can introduce biases into the data. Those birds recaptured by ringers will to some extent reflect the distribution of ringers and there is a similar effect with birds which are resighted. The distribution of recoveries of dead birds is dependent upon the number of birds in an area, the number that die and the number that are found and reported. These data also have biases (particularly for shot birds), but as ringers and resighters tend to be aggregated and may be in areas rarely visited by members of the public, removing those birds recaptured or resighted reduces the bias to some extent. For 11 of the 16 species for which we have analysable data sets, the majority of data were from birds reported dead. The exceptions were Mute Swan (*Cygnus olor*), Greater White-fronted Goose (*Anser albifrons*), Greylag Goose (*Anser anser*), Black-headed Gull (*Larus ridibundus*) and Black Tern (*Chlidonias niger*), for which there are large numbers of resightings of individually colour-marked birds or reading of metal ring numbers in the field. Comparisons of the distribution of birds found dead and those found alive showed large differences, with resightings being concentrated in western Europe (Figure 2.5). To reduce bias, but maintain maximum.

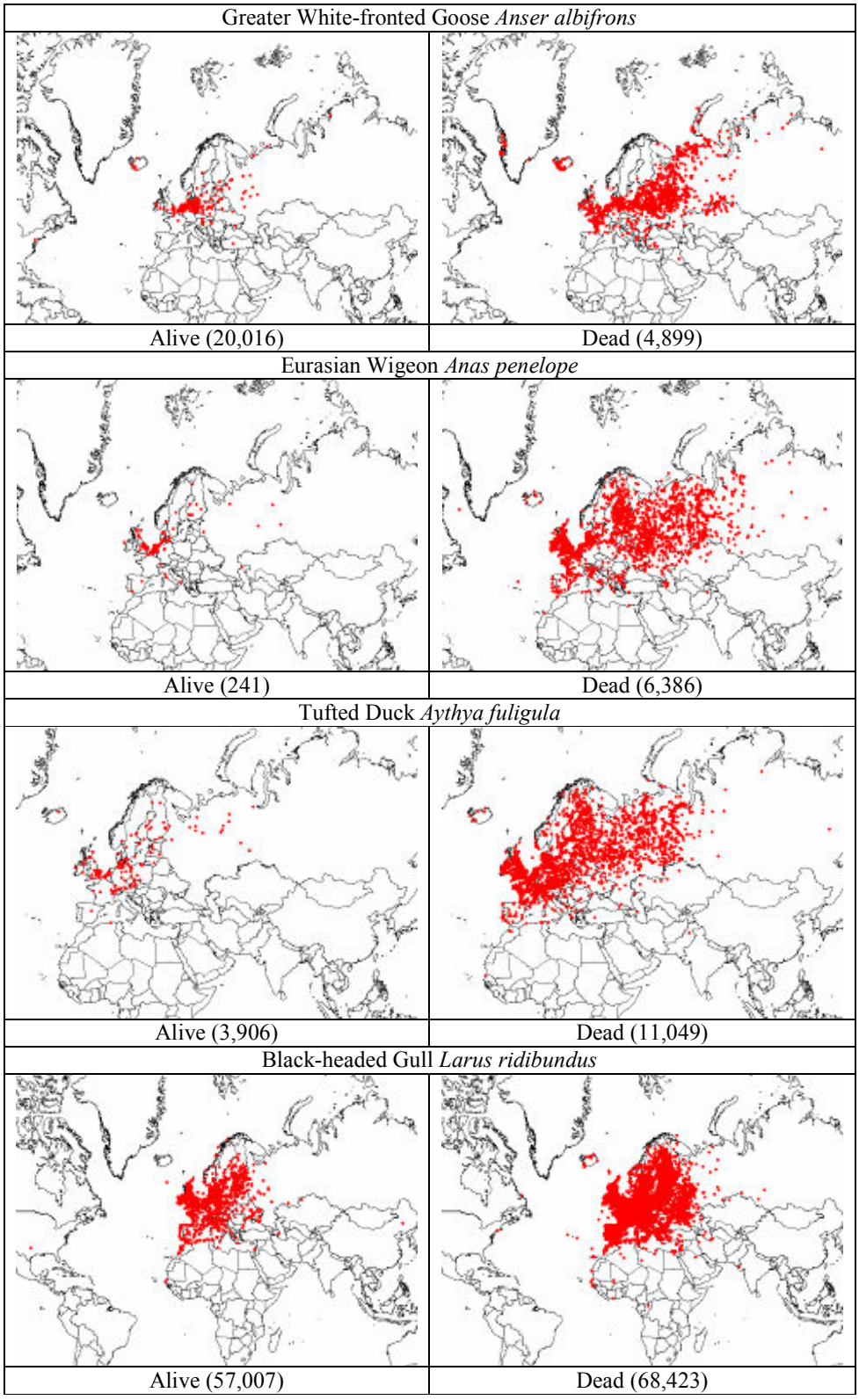


Figure 2.5: A comparison of the distribution of recoveries for birds reported alive and those reported dead for four species.

data, only reports of dead birds were plotted. Dead birds were defined as those with EURING finding condition of 1-6 and 9 (see www.euring.org for a full list of finding conditions). For ducks and geese, these will mostly refer to shot birds and aggregations will inevitably remain in the data presented. However, when using dot maps such aggregations will tend to be masked, as multiple recoveries in the same place are not apparent. However, it has been shown for wildfowl that the distribution of recoveries 'deliberately taken by man' (largely shot), is more widespread and representative than those with other causes (Wernham *et al.* 2002).

For each species a map is provided in an Annex 2.1 showing the number of birds ringed in each country and later found dead (either within or outside that country) to put the recovery locations into context.

2.7.1.2 Compilation of migration synopsis tables

The data generated by national ringing schemes have been analysed in some detail for some countries (Table 2.12) and these sources have been used to generate a summary of the known movements. To maximise the ability to refer back to individual sources, countries or regions may appear more than once. If this occurs it is due to different sources being used. In many species it is often the case that the species occurs in both summer and winter and hence appear in the 'Population' and 'Wintering area' columns but it should be noted that these are not necessarily the same individuals and the breeding population may move and be replaced by immigrants from elsewhere in winter.

Table 2.12: References consulted in drawing up the movement summary tables. Number in tables indicate which reference was used in drawing up each line of data in the tables.

Number in Tables	Reference
1	Bauer, H.G., Bezzel, E. & Fiedler, W. (eds.) 2005. *Kompendium der Vögel Mitteleuropas*. Aula-Verlag, Wiebelsheim.
2	Speek, B.J. & Speek, G. (1984). *Thieme's vogeltrekatlas*. Thieme, Zutphen.
3	Wernham, C., Toms, M., Marchant, J., Clark, J., Siriwardena, G. & Baillie, S. (eds.) 2002. *The Migration Atlas: movements of the birds of Britain and Ireland.* T. & A.D. Poyser, London.
4	Fransson, T. & Pettersson, J. (2001): *Svensk ringmärkningsatlas. Vol. 1.* Stockholm. Including preliminary printouts for volume 2 (unpublished, 2006)
5	Bønløkke, J., Madsen, J.J., Thorup, K., Pedersen, K.T., Bjerrum, M. & Rahbek, C. in press. *Dansk Trækfugleatlas. The Danish Bird Migration Atlas* (to be published spring 2006). Rhodos International Science & Art Publishers Ltd., Holtegaard, Humlebæk, Denmark.
6	Unpublished printout of recovery maps from the Helsinki Bird Ringing Scheme.
7	Roggeman, W., Huisseune, D., Vangeluwe, D., Vandenbulck, P. & Vandousselare, P. 1995. *Belgian Ringing Scheme Databank. Gaviidae to Anatidae*. Studiedocumenten van het K.B.I.N., Brussels.
8	Scott, D.A. & Rose, P.M. 1996. *Atlas of Anatidae Populations in Africa and Western Eurasia.* Wetlands International Publication 41.
9	Bakken, V., Runde, O. & Tjørve, E. 2003. *Norsk Ringmerkings Atlas. Lommer - Alkefugler.* Ringmerkingssentralen, Stavanger Museum.

10	Bianki, V.V. & Dobrynina, I.N. 1997. *Anseriformes, Dabbling ducks.* In: Pavlov, D.S. (series ed.): *Migrations of Birds of eastern Europe and Northern Asia*. Nauka, Moscow.
11	Veen J., Yurlov, A.K., Delany S.N., Mihantiev, A.I., Selivanova, M.A. & Boere, G.C. 2005. *An atlas of movements of Southwest Siberian waterbirds.* Wetlands International, Wageningen, The Netherlands.
12	Recovery maps from the Italian Bird Ringing Scheme
13	Czech Duck Ringing project. URL: http://www.mujweb.cz/veda/aythya/menu/records.htm

2.7.1.3 Compilation of summary maps of ring recoveries

The summary maps have been compiled from two data sources (see example of Common Teal *Anas crecca* in Figure 2.6 below). The distribution maps are based on those published in Bauer *et al.* (2005) and orange arrows have been overlaid to show the main "migration streams" as revealed from the synopsis tables and the recoveries stored in the EURING data bank. The distribution maps have not been altered for this project. This means that in a few cases the distribution does not entirely fit with the information given by the arrows, which represent a later state of knowledge.

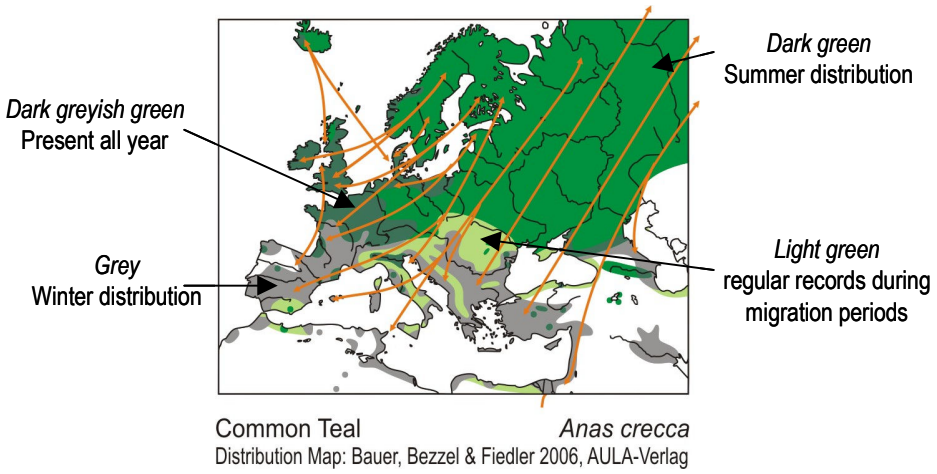


Figure 2.6 Key to the distribution and movement summary maps

As always, when information from ringing and recovery points is transformed into linear data, some personal estimation has to be included. We did this according to best knowledge but there are some parts in the figures that clearly need to be based on more data, a more in-depth study and probably a discussion of alternative interpretations. The arrows mainly include information about the direction of main migration streams. They are not intended to represent "migration pathways", since most of the species migrate on a broad front. Their ends do not necessarily mean that migrants are expected to land exactly at these places. Also, there is no information about length of non-stop flights in the lengths of the arrows. A main migration event can happen along one arrow or along several arrows in a chain. However, when there was suitable information we tried to indicate important sites by disruption of arrow chains. Finally, the usage of very heterogeneous sources leads to a high variance in data availability for different (sub-)

populations. This may lead to the fact that some less frequented directions may be known and indicated for some countries (e.g. Britain, Denmark) and may be missing for others (especially in eastern Europe).

2.7.1.4 Migration terminology

Migration can take many different forms. The seventeen species in this chapter are generally *broad front migrants,* which migrate in short hops, stopping frequently on route, and often have geographically diffuse migration routes. This distinguishes them from *leap migrants*, which migrate in long-haul journeys stopping at only a few, usually discrete, sites, such as wetlands, often in large numbers. A primary example of the latter would be migrating estuarine shorebirds but undoubtedly some of the species considered here, such as those that over-winter in sub-Saharan Africa, will undergo leap migrations. The autumn and spring migration may take place across a similar network of sites but often individuals can take different migration routes in spring and autumn. This is termed *loop migration*.

Another form of migration frequently referred to in this report is *moult migration.* Ducks, geese and swans often become flightless when they are replacing wing feathers and therefore need a safe moulting area (usually close to or surrounded by a large body of water) and a plentiful supply of food. Many ducks and geese undertake moult migrations, some of which can be long-distance. For example, there are a number of recoveries of male Tufted Ducks moulting in Britain in early summer (June-July) in eastern Russia and Kazakhstan during the breeding season. This also highlights that males and females may take different routes or have different migration strategies.

2.8 Mute Swan (*Cygnus olor*)

2.8.1 Numbers and distribution

Figure 2.7 shows that the most important sites for Mute Swan are on the Caspian shores of Azerbaijan, Russia, and Kazakhstan. The northern Black Sea coast of Ukraine and the western Baltic coasts of Denmark and Germany are other notable areas of importance. The species is only partially migratory and these areas are important all year round.

Moulting concentrations of Mute Swans in the north Caspian Sea produce by far the highest site totals, with 344,000 having been recorded in the Volga Delta in 1987 (Kuznetzov *et al.* 1998) and 121,000 on the north Caspian coast of Kazakhstan in 2003 (Table 2.13). In January, high site totals are recorded further south in the Caspian, for example 12,593 at Gyzylagach Nature Reserve (Azerbaijan) in the 1990s and 5,450 at Lake Sarykamysh (Turkmenistan) in 2003. The country with the largest number of sites important for Mute Swans is Germany, where a cluster of important sites on the south Baltic coast extends into Denmark, where the most important site in this Baltic complex is Lolland Northwest, which held 14,565 Mute Swans in January 1994. The third most important complex of sites important for Mute Swans is along the north Black Sea coast in Ukraine, where 14,510 Mute Swans were counted in the Eastern Sivash in January 2000. In southeast Europe, the Meric Delta in Turkey held 8,500 Mute Swans in January 1991.

Table 2.13: Mute Swan *Cygnus olor*: Peak January counts between 1990 and 2005 at all sites in Europe, Africa, West and Central Asia where 500 or more have been recorded.

Country	Sitename	Year	Count	Type	Ref.
Austria	Donau: Wilhering-Linz	2003	540	J	17
Azerbaijan	Caspian Coast: Gyzylagach Nature Reserve		12593	J	17
Azerbaijan	Kirov Bay	1991	8500	J	17
Azerbaijan	Caspian Coast: Alyat Bay		5830	J	17
Azerbaijan	Kura River Estuary		1879	J	17
Azerbaijan	Mahmudchala Lake		1280	J	17
Azerbaijan	Shorgel (Gushgel, Chala) Lakes		1110	J	17
Azerbaijan	Caspian Coast: Pyrallahy Island		959	J	17
Azerbaijan	Aggel (Ah Gol) Lake	1991	900	J	17
Azerbaijan	Caspian Coast: Gobustan Bay		699	J	17
Azerbaijan	Lake Aggyol		672	J	17
Azerbaijan	Sarysu Lake (Sarasuy)		667	J	17
Azerbaijan	Caspian Coast: Shakdilli Spit		652	J	17
Bulgaria	Pomorie Lake Complex	2003	1190	J	17
Bulgaria	Atanasovo Lake Complex	1999	768	J	17
Denmark	Lolland NW	1994	14565	J	17
Denmark	Roskilde Fjord	1993	7155	J	17
Denmark	Nakskov Fjord	1997	6478	J	17
Denmark	Sydfynske Hav	2001	4929	J	17
Denmark	Odense Fjord	1996	2773	J	17
Denmark	Mariager Fjord	1994	1370	J	17
Denmark	Harbour + Agger Tanger	2002	1039	J	17

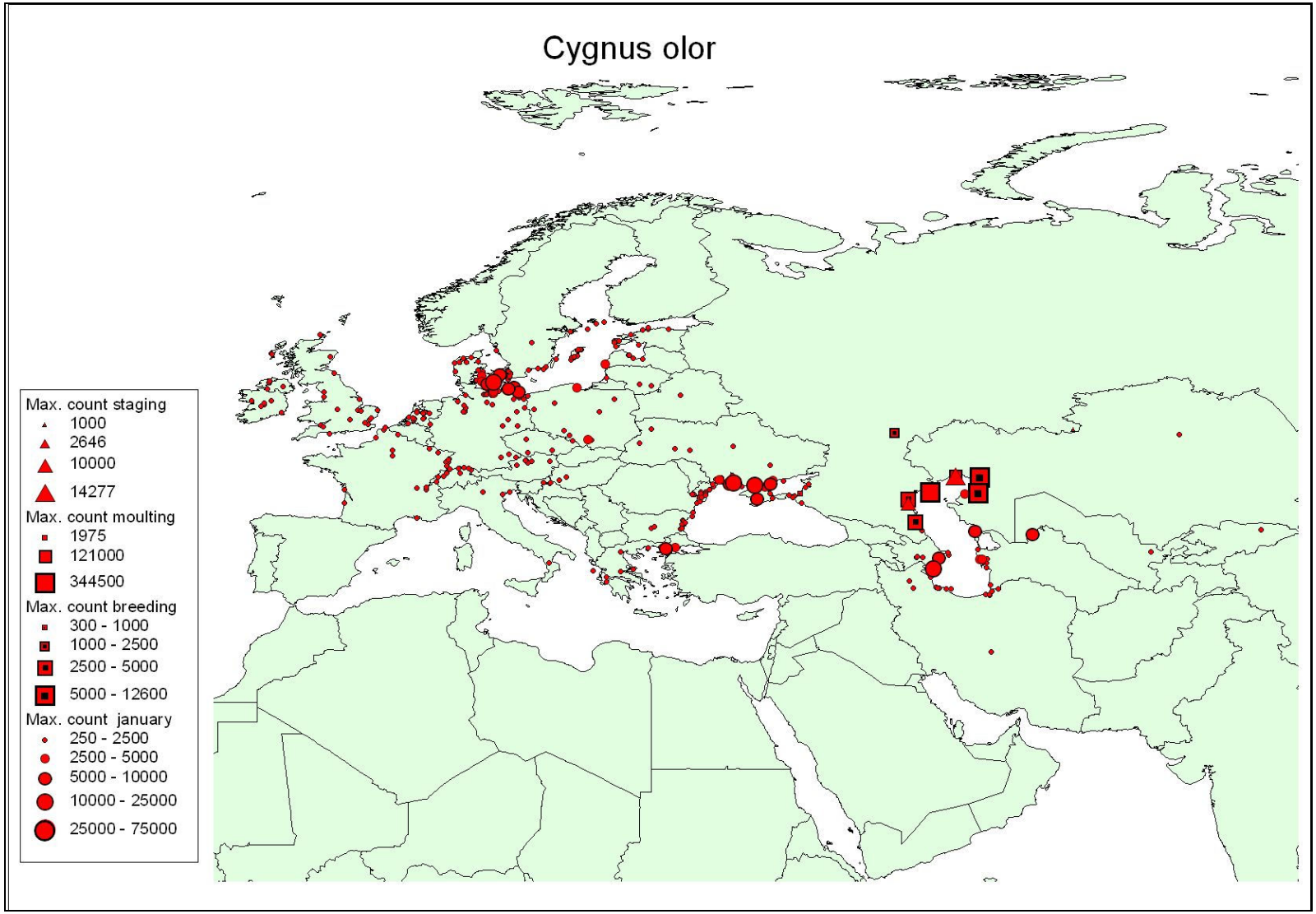


Figure 2.7: Mute Swan *Cygnus olor*: Peak counts between 1990 and 2005 at sites in Europe, West and Central Asia where 250 or more have been recorded.

Table 2.13 continued: Mute Swan *Cygnus olor*

Country	Sitename	Year	Count	Type	Ref.
Denmark	Gavno	2002	967	J	17
Denmark	Helnes Bugt	1992	879	J	17
Denmark	Basnaes Nor	1991	827	J	17
Denmark	Ulvedybet	1994	800	J	17
Denmark	Helnæs Bay	2003	743	J	17
Denmark	Lovns Bredning	1998	599	J	17
Denmark	Stavns Fjord	1990	596	J	17
Denmark	Holsteinborg Nor	1999	575	J	17
Denmark	Guldborgsund	2003	537	J	17
Estonia	Kudema Bay: Total	2000	2500	J	17
Estonia	Sorve Peninsula (W-Coast)	1994	1182	J	17
Estonia	Vilsandi Island Consolidation	1996	805	J	17
Estonia	Tagalaht Bay: Total	1996	669	J	17
Estonia	Lohusalu Bay	1994	659	J	17
Estonia	Kihnu Island (West Coast)	1991	600	J	17
Finland	Turku-Åland Ferry	2003	1902	J	17
Finland	Foglo 1	2001	722	J	17
France	Cours Du Rhin (67 / 68)	2002	2219	J	17
France	Dombes-Vallée De L'Ain	2004	864	J	17
France	Bassin D'Arcachon	2003	820	J	17
France	Littoral Dunkerquois	1991	584	J	17
France	Haut Rhône (01 / 73 / 74)	2002	504	J	17
Germany	Wendisch Langendorf-Barth	2002	7925	J	17
Germany	Struck-Lubmin	1993	7780	J	17
Germany	Seehof-Wittower Fähre-Breetzer Bodden	1996	6000	J	17
Germany	Insel Hiddensee (O)	1999	4970	J	17
Germany	Insel Ummanz	1999	3990	J	17
Germany	Insel Hiddensee	1993	3562	J	17
Germany	Boddengewässer Barhöft-Wendisch Langendorf	1993	3100	J	17
Germany	Stralsund-Barhöft	1992	3044	J	17
Germany	Salzhaff	1993	3016	J	17
Germany	Boiensdorfer Werder-Poeldamm	2002	2686	J	17
Germany	Glewitzer Fähre-Groß Schoritz	1992	2606	J	17
Germany	Kubitzer Bodden: Bessiner Haken-Neuendorf	1993	2570	J	17
Germany	Boddengewässer Waase - Gingst - Seehof	2001	2418	J	17
Germany	Silmenitz-Lauterbach	2002	2384	J	17
Germany	Lubmin-Ludwigsburg	1993	2009	J	17
Germany	Kooser See-Gristower Wiek Und Riems	1992	1948	J	17
Germany	Kubitzer Bodden: Neuendorf-Lieschow. Priebowsche & Landower Wedde	1993	1850	J	17
Germany	Strelasund: Altefähr-Bessiner Haken	1998	1680	J	17
Germany	Puddeminer Wiek-Altefähr	1992	1652	J	17
Germany	Meiningen-Pramort	1995	1648	J	17
Germany	Wieck-Kooser See	1993	1580	J	17
Germany	Wismar-Hohen Wieschendorfer Huk	1993	1400	J	17
Germany	Golwitz-Fährdorfer Haken (Poel)	1997	1100	J	17
Germany	Greifswalder Bodden: Neu Reddewitz-Klein Zicker	1999	1100	J	17
Germany	Strahlbrode-Stralsund	1990	1024	J	17
Germany	Gänserastgebiete Amt Neuhaus	2002	991	J	17
Germany	Rassower Strom Und Wieker Bodden	1994	937	J	17

Table 2.13 continued: Mute Swan *Cygnus olor*

Country	Sitename	Year	Count	Type	Ref.
Germany	Rhein Bei Wiesbaden-Amöneburg (Rhein-Km 501.3-502;5)	2000	914	J	17
Germany	Rhein: Weil-Breisach	2000	887	J	17
Germany	Rhein: Nonnenweier-Kehl	2002	861	J	17
Germany	Donau: Km 2246-2405	2000	857	J	17
Germany	Insel Hiddensee (W)	1998	830	J	17
Germany	Breetzer & Breeger Bodden: Wittower Fähre - Gelmer Ort – Lebbiner	2002	823	J	17
Germany	Pramort-Zingst	1991	821	J	17
Germany	Westbucht Fehmarnsund: Sundbrücke-Orth	2002	766	J	17
Germany	Großer Jasmunder Bodden (E): Lietzow - Sagard - Spyckerscher & Mi	1994	739	J	17
Germany	Hohen Wieschendorf-Groß Klütz Höved	1992	705	J	17
Germany	Gristow-Stahlbrode	1999	698	J	17
Germany	Fährdorfer Haken-Poeldamm-Redentin	1995	652	J	17
Germany	Traveförde: Dassower See	2001	610	J	17
Germany	Tollensesee (N)	1990	597	J	17
Germany	Ludwigsburg-Wieck	1999	596	J	17
Germany	Neuendorfer Wiek	1993	515	J	17
Germany	Dierhagen-Ahrenshoop	2000	500	J	17
Germany / Switzerland / Austria	Bodensee Gesamt	2002	2241	J	17
Greece	Evros Delta	1999	2623	J	17
Greece	Keramoti Lagoons	1994	1143	J	17
Greece	Messolonghi Lagoon (From River Evinos To River Acheloos)	1994	1014	J	17
Greece	Ptelea Lagoon (Karakatsali) / Elos	1998	735	J	17
Greece	Megalo Livari Istiaias (Secondary)	1993	600	J	17
Hungary	Balaton: Total	1993	542	J	17
Iran	Anzali Mordab Complex: Selkeh Protected Region	2003	1920	J	17
Iran	Anzali Mordab Complex: Anzali Marsh East	2003	1750	J	17
Iran	Lavandavil Wildlife Refuge: Lavandavil Marsh	2003	1510	J	17
Iran	Anzali Mordab Complex: Siakeshim Protected Region	2003	1380	J	17
Iran	Abbas-Abad Dam	2003	1370	J	17
Iran	Gomishan Marsh	2003	1295	J	17
Iran	Miankaleh W.R. & Gorgan Bay: Gorgan Bay	1998	957	J	17
Iran	Anzali Mordab Complex: Sorkhankel	2003	950	J	17
Iran	Amirlayeh & Sheikh Ali Kol: Amirlayeh Lake	2003	940	J	17
Iran	Miankaleh W.R. & Gorgan Bay: Lapoo - Zaghmarz Ab-Bandan	1998	820	J	17
Iran	Miankaleh W.R. & Gorgan Bay: Miankaleh Protected Region	1998	644	J	17
Ireland	Shannon Callows: Total	1995	706	J	17
Italy	Laguna Di Venezia	2003	976	J	17
Italy	Laguna Di Caorle E Valli Di Bibione	2001	586	J	17
Kazakhstan	North Caspian Coast Novinsky Islands - vil. Prorva	1987	12600	B	26
Kazakhstan	North Caspian Coast vil. Prorva - Ural Mouth	1987	5200	B	26
Kazakhstan	Karakol Lake	1991	8000	J	17
Kazakhstan	Caspian Coast. O-Va Durneva-Turmenia Border (300Km	1991	4000	J	17
Kazakhstan	Kurgaldjinskyi Reserve	1995	854	J	17
Kazakhstan	North Caspian Coast total	2003	121000	M	17
Kazakhstan	North Caspian Coast total	2002	14277	S	13
Kyrgyzstan	Issyk-Kul Lake: Total	1999	1213	J	17
Latvia	L.Liepajas North Part	2001	3542	J	17

Table 2.13 continued: Mute Swan *Cygnus olor*

Country	Sitename	Year	Count	Type	Ref.
Latvia	Ragaciems	1992	718	J	17
Lithuania	Kaunas Lake & Nemunas River In Kaunas City	1996	897	J	17
Netherlands	Wolderwijd	2001	1859	J	17
Netherlands	Veluwemeer	2000	1800	J	17
Netherlands	Krimpenerwaard	2000	1588	J	17
Netherlands	Alblasserwaard	2002	1380	J	17
Netherlands	Markiezaat	1992	803	J	17
Netherlands	Ijssel	2000	693	J	17
Netherlands	Limburgse Maas	2002	566	J	17
Poland	Zat. Gdanska	1993	3195	J	17
Poland	Wisla: + Zbiornik Leczany	1993	2532	J	17
Poland	Odra: Krzepkowice-Brzeg Dolny (160 Km)	1993	800	J	17
Poland	Wisla: Krakow	1993	650	J	17
Poland	Odra: Upper Course	1995	630	J	17
Poland	Vistula River-Krakow (Urban Centtre Section)	1996	549	J	17
Poland	Odra: Chalupki-Krapkowice	1993	515	J	17
Romania	Delta Dunarii (Danube Delta)	1994	2394	J	17
Romania	Furtuna	1997	1500	J	17
Romania	Neptun Pond	1997	500	J	17
Russia	Volga Delta	1987	344500	M	27
Russia	Volga Delta	1987	14000	B	27
Russia	Norhwest Caspian coast within Dagestan total	1987	3717	B	26
Russia	Norhwest Caspy and lakes within Kalmykia		2700	B	26
Russia	Lower Volga (Saratov reg.)		2100	B	38
Russia	Kuban Delta		800	B	12
Russia	Volga Delta		1967	J	17
Russia	Sea of Azov: Tamansky Bay		1523	J	17
Russia	Group of limans between the Kuban and Protoka		656	J	17
Russia	Kyzlyar Bay		10000	S	7
Russia	Lakes of South Ural		1000	S	15
Sweden	Tåkern	1992	2200	J	17
Sweden	Yttre Foteviken.24	1992	1190	J	17
Sweden	S. Höllviken.21	2000	1162	J	17
Sweden	Janstorp.25	1999	1055	J	17
Sweden	Bjärred.36	2002	680	J	17
Sweden	Gausviken.67	1992	600	J	17
Sweden	Klagshamn-Sibbarp.29	1996	600	J	17
Sweden	Burgsviken.77	1994	567	J	17
Sweden	N. Lundåkrabukten.42	1994	554	J	17
Sweden	Skanör-Knösen.20	1994	535	J	17
Sweden	N. Höllviken.22	1995	530	J	17
Switzerland	Lac De Neuchâtel	1996	825	J	17
Switzerland	Lac Léman-Ch	1992	752	J	17
Turkey	Meric Delta	1999	8900	J	17
Turkmenistan	Lake Sarykamysh	2003	5450	J	17
Turkmenistan	Krasnovodsk Gulf (Convention Mar)(Turkmenbasti)	2004	3830	J	17
Turkmenistan	Krasnovodsk & North-Cheleken Bays	1991	2530	J	17
Turkmenistan	Balkhan Gulf (Convention Mar)	2004	1117	J	17
Turkmenistan	North Cheleken Gulf	2004	836	J	17

Table 2.13 continued: Mute Swan *Cygnus olor*

Country	Sitename	Year	Count	Type	Ref.
Ukraine	E. Sivash	2000	14510	J	17
Ukraine	Black Sea State Biosphere Reserve	1990	10700	J	17
Ukraine	Utl'Ukskij Liman	1991	8200	J	17
Ukraine	Crimea (Region)	1992	5867	J	17
Ukraine	M. Sivash	1991	3810	J	17
Ukraine	Area Northeast Of Odessa	1998	3360	J	17
Ukraine	Molochnoe Oz.	2000	2841	J	17
Ukraine	Danube Delta	1993	2380	J	17
Ukraine	Gebriianov Bay	1995	2200	J	17
Ukraine	Secondary Delta Of The Kiliya Channel (Danube)	2000	1939	J	17
Ukraine	Kherson (Region)	1994	1627	J	17
Ukraine	W. Sivash	1991	1500	J	17
Ukraine	Dnester Delta + Liman	1991	1388	J	17
Ukraine	Stencovskie Plavny	1998	1290	J	17
Ukraine	Dzharylhatskyj Bay Area I	2000	1280	J	17
Ukraine	Dzansheisky. Shagany; Alibey; Burnas Limans	1995	1160	J	17
Ukraine	Odessa (Region)	1990	1001	J	17
Ukraine	Egorlicky (Jagorlycki) Bay	1995	1000	J	17
Ukraine	Lakes Kagul.Kugurlui And Ialpug	1996	870	J	17
Ukraine	Sasyk Liman + Adjacent Sea Area	1998	770	J	17
Ukraine	Adzihol Lake	1998	700	J	17
Ukraine	Budaksky + Gribovsky Limans	1995	700	J	17
Ukraine	Vinitsa (Region)	1992	643	J	17
Ukraine	Beresansky Liman	1991	630	J	17
Ukraine	Cherkassi (Region)	1990	575	J	17
Ukraine	Lakes Kugurlui And Ialpug	1995	540	J	17
Ukraine	Zaporozhye (Region)	1992	507	J	17
United Kingdom	Loughs Neagh & Beg	1999	1495	J	17
United Kingdom	Fleet And Wey	2003	1368	J	17
United Kingdom	Loch Of Harray	1991	1171	J	17
United Kingdom	Somerset Levels	2001	1110	J	17
United Kingdom	Upper Lough Erne	1997	590	J	17
United Kingdom	Ouse Washes	2002	555	J	17

2.8.2 Mute Swan movements

The breeding area of the Mute Swan covers west and central Europe (including southern Scandinavia and the area around the Baltic). The species also breeds locally in eastern and south-eastern Europe and locally eastward to China. The Mute Swan has also been introduced to several other continents during recent time. It is sedentary in some areas while partially or wholly migratory in others.

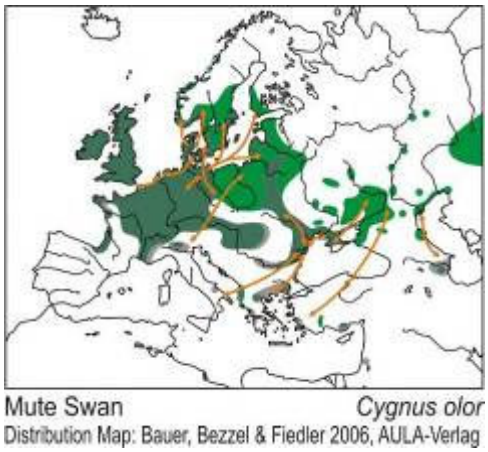


Figure 2.8 Map depicting the movements of Mute Swan *Cygnus olor* based on published information and ring recoveries in the EURING Data Bank.

The recovery rate of ringed Mute Swans is very high and a large number of recoveries is therefore available. The largest numbers of recoveries are from Britain, Germany, the Netherlands and Sweden. The geographical distribution of recoveries follows to a great extent the breeding range in Europe. Birds from the northernmost breeding area in Sweden, Finland and the Baltic States regularly move SW to wintering areas in southern Sweden, Denmark and northern Germany. Mute Swans in Britain & Ireland, NW France, Belgium, the Netherlands, W Germany and Norway are mainly sedentary but can perform short-distance movements. Some central European breeders move west and south. Birds breeding in Ukraine leave inland lakes and move to the coast of Black Sea, Danube Delta or continue to the Balkans and Italy. Mute Swans in the Caspian Sea area mainly perform short-distance movements within this area. It is well known that the species can perform mass movements in severe winters in order to leave freezing lakes. The distribution by months indicates that many Mute Swans leave inland areas in the north and east, and concentrate in coastal areas during the winter months. Non-breeders perform moult migrations and are sometimes found in large concentrations in restricted areas.

Table 2.14: Summary of the movements of Mute Swan *Cygnus olor* from the literature based on published information and ring recoveries in the EURING Data Bank

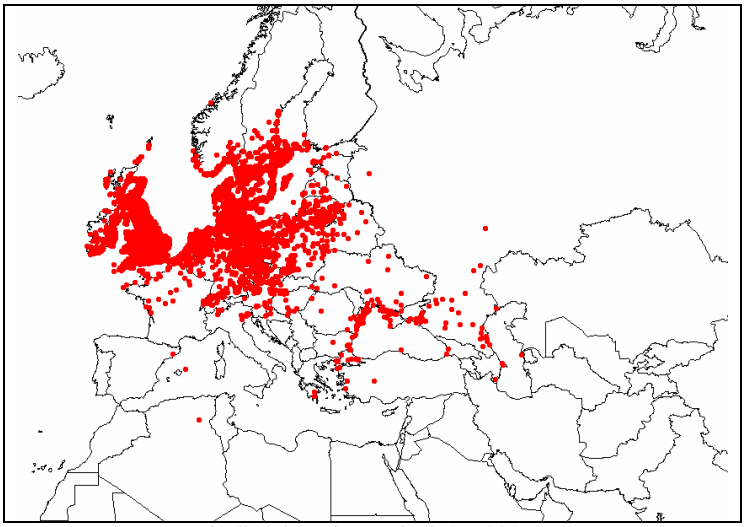
Mute Swan *Cygnus olor*

Distribution: Palaearctic. Between 40° and 60°N from western Europe to northeast China.

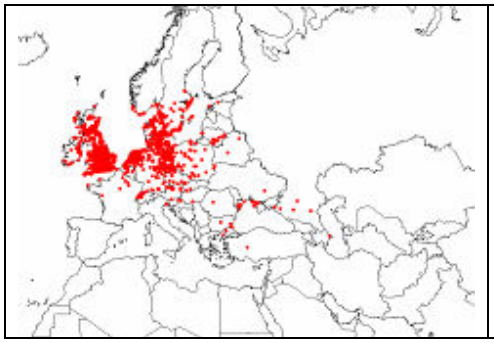
Moult migration: July and August. Moult movement from mid-May to mid-June, returning in September

Population (or part of population)	Autumn Migration		Wintering / Non-breeding Grounds		Spring Migration		References
	direction / via	during	location	during	direction / via	during	
Northwest to central Europe			(mainly sedentary)				8
Scandinavia-Baltic Group: Finland, Baltic Republics (increasingly sedentary), Poland, Sweden	W	Jan-Mar	Sweden, Denmark, Poland, Estonia, Latvia, Norway, Lithuania, Germany, Russia, Netherlands, Great Britain, France, coasts of Baltic Sea				1, 2, 3, 5, 6, 8, 9
Baltic population	some via Poland, Czech Rep.?		(mainly sedentary), migration occurs to Slovenia, Italy, few birds Southern North Sea, Central Europe				8, 12
Southern Sweden	SW	Dec-Feb	Sweden, Denmark, Northeast Germany				4
East Germany, Schleswig-Holstein			Denmark, Netherlands				2, 5, 6
Denmark, Norway	ESE to SSE	Sep-Dec	Netherlands, Germany, Poland, Czech Rep., Slovakia				1, 2, 5, 6
Southern and eastern Norway			(mainly sedentary) Denmark, Northern Germany, Sweden, Norway				9
Northern Denmark			coast of Norway, Sweden, few to Netherlands				5, 9
Netherlands Group: Netherlands, Nordrhein-Westfalen, Belgium, Northwest France	NNW to ENE		(mainly sedentary) Denmark, Norway, Belgium, Germany, coast of NW-France, Netherlands, Sweden, northern Germany, Poland coast	Jan-Mar			1, 2, 5, 7, 9

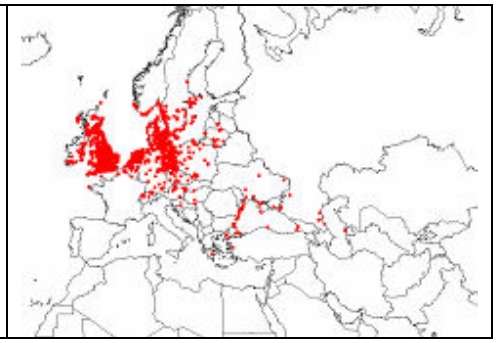
England and Wales Group	SE		largely sedentary; (exchanges between Denmark, Netherlands, northern France, Sweden, Germany)				1, 2, 3, 5
Scotland Group (mainland, Orkneys)			(sedentary)				1, 3
Scotland (Hebrides) Group		Jan-Mar	(mainly sedentary) Norway (1 ringing recovery)				1, 3, 9
Irish Group			(sedentary)				3
Eastern Europe							
inland Black Sea, Sea of Azov			(limited migration); coasts of Black Sea, few to Danube, Caspian Sea, Delta, Balkan peninsula, Greece, Turkey, southern Italy				3, 8
Ukraine (Black Sea Reserve)			Romania, Bulgaria, Greece, Turkey, Italy				8, 12
Poland	SW / S		Eastern Germany, Czech Republic, Slovak Republic, Austria, Hungary				8
Caspian Region and Central Asia	Mostly sedentary						8
Volga Delta, Caspian Sea			Within Caspian Sea and adjoining lakes interior lakes Azerbaijan, Dagestan; mass migration (mainly westerly directions) occurs in severe winters				8
South Caspian region			immatures Iran, few Iraq				8



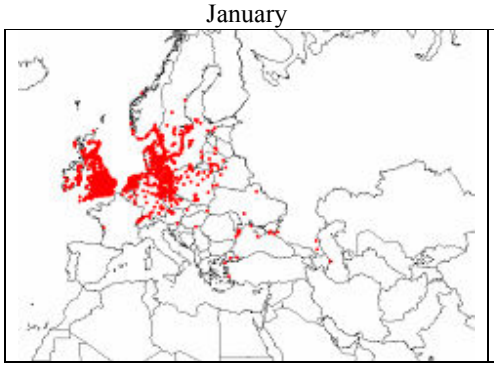
Finding locations of all dead birds



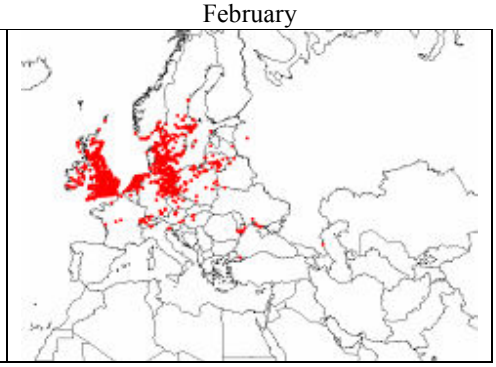
January



February



March



April

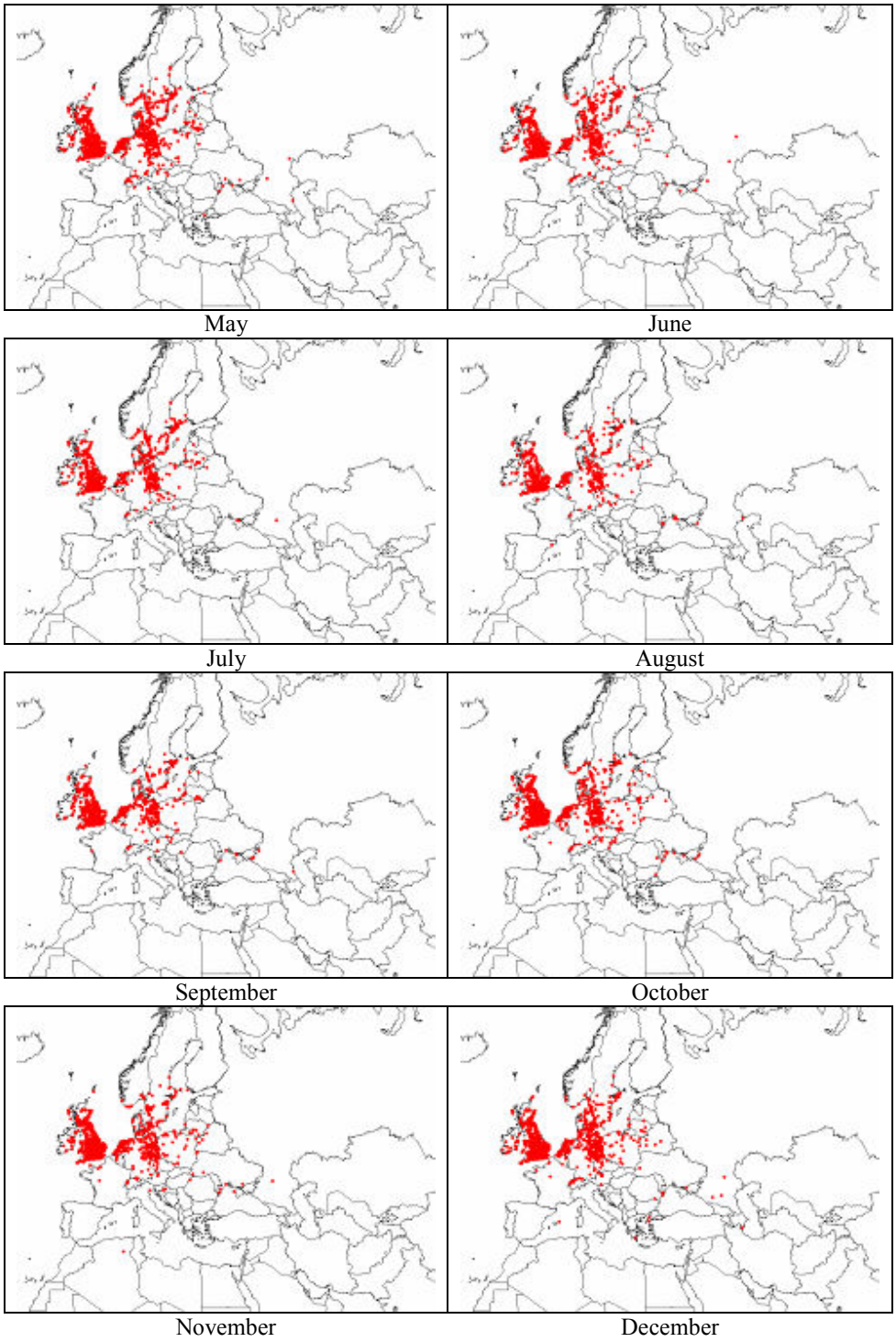


Figure 2.9 Finding locations of all dead Mute Swans *Cygnus olor* in the EURING data bank. All birds are presented and also broken down by month.

2.9 Greater White-fronted Goose (*Anser albifrons*)

2.9.1 Numbers and distribution

The biggest wintering concentrations of White-fronted Geese occur in lowlands north and west of the Black Sea in Ukraine, Romania and Bulgaria, in central Europe on the plains of Hungary, and in northwest Europe in the Netherlands and north Germany (Figure 2.10). All these populations migrate to northern Russia to breed, and a number of key staging areas are known in Russia and Kazakhstan.

The most important sites for Greater White-fronted Goose are in The Netherlands and Germany where 112,000 at Ijsselmeer in 1991 and 40,130 at Düffel in 2002 are typical of the highest peak counts. (Table 2.15). The north and east coastal regions of the Black Sea also hold large flocks, with 193,873 at Shabla Lake in Bulgaria in 2000 being the highest single recent count. The lowlands adjacent to the Black Sea in Romania and Ukraine have recorded peak counts of 78,000 at Lake Sinoie in 1992 and 85,042 in the Central Sivash in 1998, respectively. The most important wintering site for the central European wintering birds is Hortobagy in Hungary, where there were 130,000 in January 1992. The species stages in spectacular numbers at a number of sites in Russia and Kazakhstan, including Veselovskoye Reservoir (240,000 birds, Gineev et al., 2002), The Neman River Delta (90,000, Svazas et al., 2003), and Olonets Plain, Karelia (80,000, Berezovikov, 2002). In Kazakhstan, 423,000 were recorded staging at lakes north of Kurgalin N R, and many high counts are made in the autumn in the Kustanay region.

Table 2.15: Greater White-fronted Goose *Anser albifrons*: Peak counts between 1990 and 2005 at sites in Europe, West and Central Asia where 4,000 or more have been recorded.

Country	Sitename	Year	Count	Type	Ref.
Austria	Neusiedlersee. Seewinkel; Hansag	2001	30503	J	17
Austria	Neusiedler See (Austrian Part)	2004	4294	J	17
Azerbaijan	Caspian Coast: Gyzylagach Nature Reserve		11952	J	17
Belgium	Ijzerbroeken Merkem	2000	5015	J	17
Bulgaria	Shabla Lake Complex	2000	193873	J	17
Bulgaria	Durankulak Lake Complex	2003	108378	J	17
Bulgaria	Mandra Lake	1997	61150	J	17
Bulgaria	Srebarna Lake	1992	45155	J	17
Bulgaria	Burgas Lake (Vaya)	2000	42370	J	17
Bulgaria	Piasachnik Reservoir	1999	36753	J	17
Bulgaria	Ovcharitza	1995	34755	J	17
Bulgaria	Black Sea Coast: Kavarna-Balchik-Kranevo	1999	18480	J	17
Bulgaria	Small Natural Or Artificial Lenthic Wetlands In North Bulgaria	2003	17914	J	17
Bulgaria	Malko Sharkovo Reservoir	1997	16810	J	17
Bulgaria	Atanasovo Lake Complex	2000	16010	J	17
Bulgaria	Zrebchevo Zhrebchevo Reservoir	1997	13850	J	17
Bulgaria	Tzerkovski Tserkovski Reservoir	1996	8500	J	17

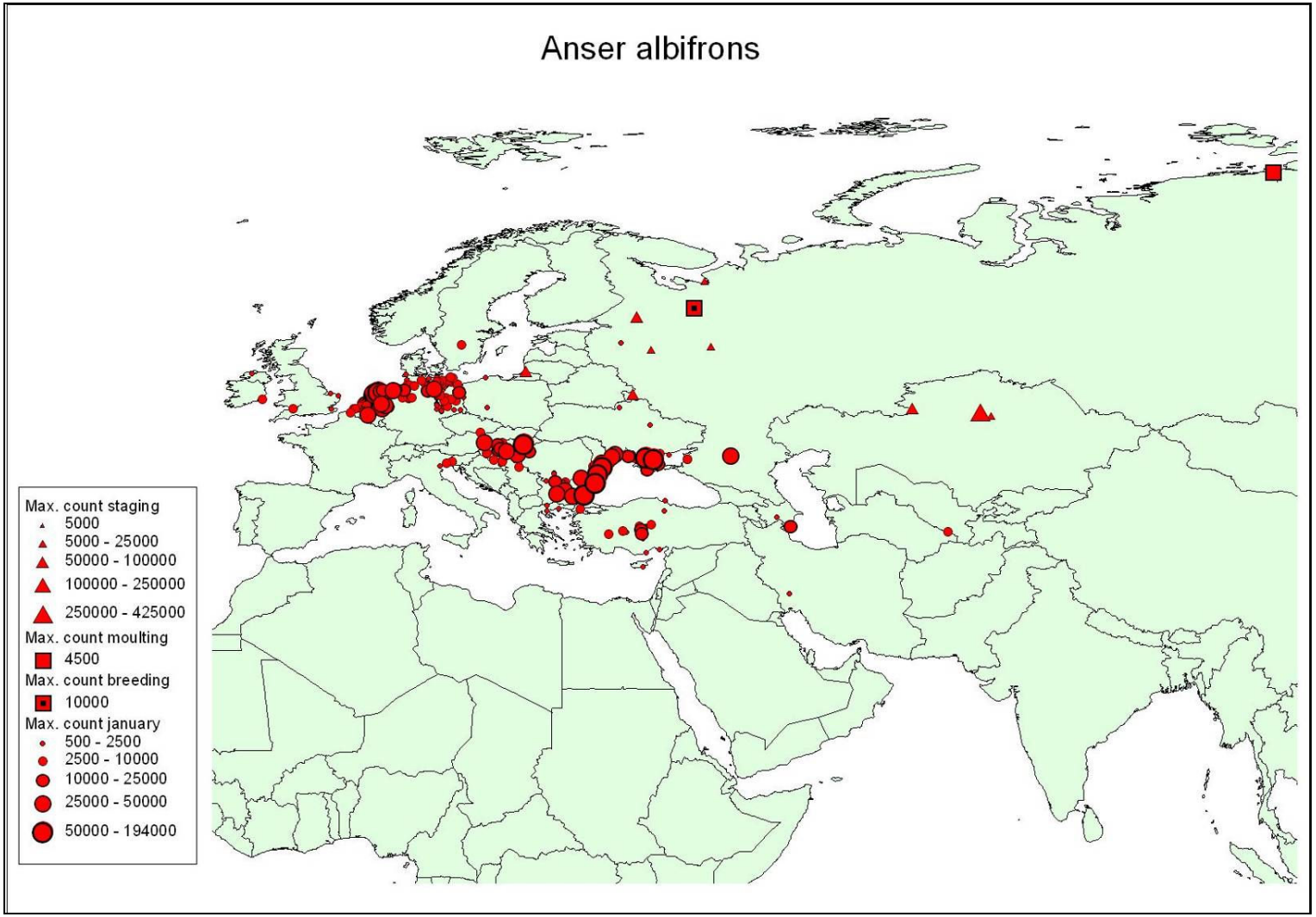


Figure 2.10: Greater White-fronted Goose *Anser albifrons*: Peak counts between 1990 and 2005 at sites in Europe, West and Central Asia where 500 or more have been recorded.

Table 2.15 continued: Greater White-fronted Goose *Anser albifrons*

Country	Sitename	Year	Count	Type	Ref.
Bulgaria	Black Sea Coast: Kaliakra-Kamen Brjag Bryag -Tulenovo Tyulenovo	1999	6030	J	17
Bulgaria	Sredishte	1993	6000	J	17
Croatia	Suza-Polja (Suza-Fields)	1999	5600	J	17
Czech	Nove Mlyny I & Iidam Systems	1995	8000	J	17
Germany	Düffel	2002	40130	J	17
Germany	Rheiderland	1999	36725	J	17
Germany	Bislicher Insel	1998	35380	J	17
Germany	Fischteiche der Lewitz	1998	28000	J	17
Germany	Emmericher Eyland	1996	24200	J	17
Germany	Walsumer Rheinaue	2002	20300	J	17
Germany	Salmorth	2001	19457	J	17
Germany	B 67 Xanten Appeldorn	1996	18333	J	17
Germany	Fehntjer Tief	1998	17650	J	17
Germany	Wesel-Lohrward	2000	17306	J	17
Germany	Bienener Altrhein	2000	16450	J	17
Germany	Oder (Stützkow/Piasek-Alte Oder Zaton/Schwedt)	1998	16000	J	17
Germany	B 67 Xanten Vynen	2002	15037	J	17
Germany	Lohrward-Rees	1995	14775	J	17
Germany	Gänserastgebiete Amt Neuhaus	1999	14170	J	17
Germany	Spellen-Mehrum	2003	13270	J	17
Germany	Xanten-Sonsbeck	2003	13155	J	17
Germany	Weser: Hammelwarder - Harrier Sand	2000	10680	J	17
Germany	Rheinberg	1996	10600	J	17
Germany	Emmerich Hetter	2003	10400	J	17
Germany	Wertherbruch	1997	10080	J	17
Germany	Oder (Ognica-N Widuchowa)	1990	10000	J	17
Germany	Rees- Millingen	2000	9389	J	17
Germany	Orsoy	2002	7132	J	17
Germany	Dingender Heide	1999	7050	J	17
Germany	Rheinberg Nord	1998	6920	J	17
Germany	Elbe: Gorleben – Hitzacker	2001	6814	J	17
Germany	Dollart	1990	6497	J	17
Germany	Emmerich- Hüthum	1995	6405	J	17
Germany	Dümmer	2000	6313	J	17
Germany	Glowe-Kap Arkona	1991	6050	J	17
Germany	Elbe km 445-454 / Bälow – Wittenberge	1999	6020	J	17
Germany	Blumenkamp	1997	6000	J	17
Germany	Parayer Vorfluter-Gülpe	2001	6000	J	17
Germany	Elbe: Bleckede – Hohnstorf	1994	5924	J	17
Germany	Conventer See	1991	5600	J	17
Germany	Gülper See mit Rhinmündung und Küdden	1993	5400	J	17
Germany	Oder (Alte Oder Zaton/Schwedt-Alter Oder Ognica)	1990	5250	J	17
Germany	Königsstuhl-Glowe	1990	5100	J	17
Germany	Elbe: Hitzacker - Alt Garge	1995	5035	J	17
Germany	Belziger Feldmark	1993	5000	J	17
Germany	Steinhuder Meer	2000	5000	J	17
Germany	Emsvorland: Leer – Emden	1996	4949	J	17
Germany	Unterwarnow und Breitling	1992	4800	J	17
Germany	Krummhörn	1999	4724	J	17

Table 2.15 continued: Greater White-fronted Goose *Anser albifrons*

Country	Sitename	Year	Count	Type	Ref.
Germany	Großer Jasmunder Bodden (W): Lebbiner Bodden, Liddower Strom, Tetzitzer See (Lebbiner Haken-Ralswiek)	1992	4630	J	17
Germany	Rangsdorfer See	1995	4600	J	17
Germany	Großteich Torgau	1994	4500	J	17
Germany	Seestermüher Eschschallen (Elbe-Polder 2: Pinnau bis Krückau)	2001	4300	J	17
Germany	Elbe: Schnackenburg – Gorleben	2001	4250	J	17
Germany	Weserstaustufe Schlüsselburg	2001	4100	J	17
Germany	Wattenmeer SH 14	1997	4037	J	17
Germany	Dierhagen-Ahrenshoop	1992	4000	J	17
Germany	Emmerich-Dornick	1998	4000	J	17
Germany	Havel (Fähre Ketzin-Alt Paare) - Trebelsee	2001	4000	J	17
Germany	Kellen	2002	4000	J	17
Greece	Evros Delta	1997	7000	J	17
Hungary	Hortobagy Halasto	1992	130000	J	17
Hungary	Szabadszallas Szikes To = Kisret. Zabszek Knp	1994	35000	J	17
Hungary	Nagymagocs Ret. Legelo	1994	28650	J	17
Hungary	Velencei To	1991	25000	J	17
Hungary	Geszt. Begecsi Halastavak	2002	20500	J	17
Hungary	Tac (Sarviz)	1995	20000	J	17
Hungary	Dinnyes Ferto	2000	16000	J	17
Hungary	Tata. Oreg-To	2000	10500	J	17
Hungary	Fulupszallas Szikes To = Kelemenszek Knp	1995	10000	J	17
Hungary	Fertó Tó (Lake Fertó)	1995	8603	J	17
Hungary	Biharugrai Halasto	2000	8500	J	17
Hungary	Balaton: Siofok	1999	8000	J	17
Hungary	Retszilas Halasto	2000	8000	J	17
Hungary	Sarbogard Halasto	2000	8000	J	17
Hungary	Kardoskut Reservat (Szikes To)	2002	6000	J	17
Hungary	Soponyai-Halastavak	2001	6000	J	17
Hungary	Sumony Halasto	1996	6000	J	17
Hungary	Maros: Maroslele	1993	5000	J	17
Hungary	Sio Confluence: Decs	1991	4600	J	17
Hungary	Duna / Karapancsa	1992	4500	J	17
Hungary	Szeged. Feherto Halasto + Ferto	2000	4500	J	17
Hungary	Tisza: Felgyo	1992	4050	J	17
Hungary	Kisbalaton `Regi`	2001	4000	J	17
Hungary	Nagyhegyes Elepi-H.To	2001	4000	J	17
Ireland	Wexford Harbour And Slobs: Total	2000	7900	J	17
Italy	Laguna Di Caorle E Valli Di Bibione	2003	6202	J	17
Kazakhstan	Small lakes north of Kurgaljin NR	1999	423300	S	13
Kazakhstan	Kulykol Lake, Kustanay reg.	1999	57300	S	16
Kazakhstan	Ayke Lake, Kustanay reg.	1999	47800	S	
Kazakhstan	Koybagar & Tyuntyugur Lakes, Kustanay reg.	1999	39700	S	16
Kazakhstan	Small lakes west of Kurgaljin NR	1999	21300	S	13
Kazakhstan	North Caspian Coast total	2002	12395	S	13
Netherlands	IJsselmeer	1991	112404	J	17
Netherlands	IJssel	2003	99037	J	17
Netherlands	Gelderse Poort	1992	70258	J	17
Netherlands	De Wieden	1996	65930	J	17

Table 2.15 continued: Greater White-fronted Goose *Anser albifrons*

Country	Sitename	Year	Count	Type	Ref.
Netherlands	Fluessen e.o.	1990	63100	J	17
Netherlands	Sneekermeergebied	1991	57890	J	17
Netherlands	Waal: Waardenburg – Werkendam	2001	39014	J	17
Netherlands	Donkse Laagten e.o.	1992	35419	J	17
Netherlands	Grensmaas	1997	31573	J	17
Netherlands	Lek: Wijk bij Duurstede – Schoonhoven	2003	24968	J	17
Netherlands	Nederrijn: Heteren - Wijk bij Duurstede	2000	24340	J	17
Netherlands	Oudegaasterbrekken e.o.	2001	24340	J	17
Netherlands	Krimpenerwaard	1995	24263	J	17
Netherlands	Alde Feanen	1990	23936	J	17
Netherlands	Groote Wielen	1991	22946	J	17
Netherlands	De Deelen	2002	22307	J	17
Netherlands	Leekstermeergebied	1996	21388	J	17
Netherlands	Koevordermeer	1993	20931	J	17
Netherlands	Biesbosch	1992	17453	J	17
Netherlands	Lauwersmeer	1993	14414	J	17
Netherlands	Drontermeer	2000	13950	J	17
Netherlands	Tjeukemeer	2004	12892	J	17
Netherlands	Midden-Delfland en Oude-Leede	2000	12833	J	17
Netherlands	Oostelijke Vechtplassen	2003	12816	J	17
Netherlands	Getijde-beinvloede Maas	1997	11261	J	17
Netherlands	Zwarte Meer	1992	10819	J	17
Netherlands	Slotermeer	1994	9770	J	17
Netherlands	Oudeland van Strijen	1990	9143	J	17
Netherlands	Westerschelde & Saeftinge	1991	8790	J	17
Netherlands	Ilperveld, Varkensland, Oostzanderveld & Twiske	1999	8145	J	17
Netherlands	Nijkerkernauw	2003	7170	J	17
Netherlands	Grevelingen	1999	7000	J	17
Netherlands	Waddenzee	1999	6481	J	17
Netherlands	Groote Peel	2002	5707	J	17
Netherlands	Dwingelderveld	2004	5524	J	17
Netherlands	Hollands Diep	2001	4954	J	17
Netherlands	Voordelta & Kwade Hoek	1998	4510	J	17
Netherlands	Lepelaarplassen	1992	4460	J	17
Netherlands	Zeevang	2004	4125	J	17
Romania	Lake Sinoe (= Sinoie)	1992	78000	J	17
Romania	Delta Dunarii (Danube Delta)	1993	73220	J	17
Romania	Golovita (Bisericuta-Gr. Lupilor)	1992	70000	J	17
Romania	Lakes Nuntasi And Tuzla	1992	40000	J	17
Romania	Razelm Nw	1999	17000	J	17
Romania	Techirghiol	1999	12000	J	17
Romania	Razelm Ne	1994	8000	J	17
Romania	Leahova-Periteasca	1999	6000	J	17
Romania	Isaccea	1992	5000	J	17
Romania	Martinca	1994	5000	J	17
Romania	Lake Murighiol	1999	4000	J	17
Russia	Kargopol area		10000	B	20
Russia	Lake Manych-Gudilo		47000	J	17

Table 2.15 continued: Greater White-fronted Goose *Anser albifrons*

Country	Sitename	Year	Count	Type	Ref.
Russia	Mouth of Upper Taimyra, Taimyr		4500	M	14
Russia	Veselovskoye Reservoir		240000	S	11
Russia	Neman River delta		90000	S	35
Russia	Olonets Plain		80000	S	41
Russia	Floodplains in Bryansk region		50000	S	2
Russia	Wetlands of Upper Volga, Tver region		21000	S	30
Russia	North Dvina Delta		10000	S	1
Russia	Vicinity of Kostroma Reservoir	2003	9000	S	3
Russia	Shuya farmlands, Petrozavodsk		4000	S	32
Turkey	Esmekaya Golu	1993	19400	J	17
Turkey	Tuz Golu West (Tersakan+Bulok)	1993	14700	J	17
Turkey	Kulu Or Duden Golu	1992	9718	J	17
Turkey	Isikli Golu [Civril Golu]	1993	8178	J	17
Turkey	Seyfe Golu	1992	7897	J	17
Turkey	Aksehir Golu	1990	7568	J	17
Turkey	Tuz Golu (S.& E. Shore)	1992	6618	J	17
Ukraine	M. Sivash	1998	85042	J	17
Ukraine	E. Sivash	1991	80000	J	17
Ukraine	Dniestrovskiy Liman	2001	50000	J	17
Ukraine	Lake Kitai	1995	50000	J	17
Ukraine	Stencovskie Plavny	1996	40000	J	17
Ukraine	Odessa (Region)	1990	25640	J	17
Ukraine	Dzansheisky. Shagany; Alibey; Burnas Limans	1996	23500	J	17
Ukraine	Sasyk Liman + Adjacent Sea Area	1991	20000	J	17
Ukraine	W. Sivash	1991	20000	J	17
Ukraine	Black Sea State Biosphere Reserve	1990	15200	J	17
Ukraine	Crimea (Region)	1990	12174	J	17
Ukraine	Dnepro-Bugsky (Dneprovskij) Liman	1998	7000	J	17
Ukraine	Danube Delta	1993	6700	J	17
Ukraine	Utl'Ukskij Liman	2000	6137	J	17
Ukraine	Molochnoe Oz.	2000	6018	J	17
Ukraine	Lakes Kagul.Kugurlui And Ialpug	1996	5500	J	17
Ukraine	Budaksky + Gribovsky Limans	1998	5000	J	17
Ukraine	Dnester Delta + Liman	2001	5000	J	17
Uzbekistan	Talimardzhan Reservoir	2004	4979	J	17

2.9.2 Greater White-fronted Goose movements

This species breeds at high latitudes in northern Europe, Asia and North America. It is a long-distance migrant with wintering areas in Europe, south and east Asia and southern North America.

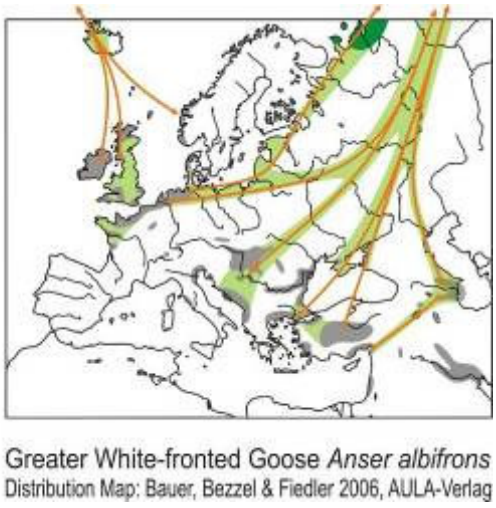


Figure 2.11: Map depicting the movements of Greater White-fronted Goose *Anser albifrons* based on published information and ring recoveries in the EURING Data Bank

The only country in Europe where the White-fronted Goose has been ringed in large numbers is The Netherlands. A reasonable number of recoveries is also available from Britain & Ireland. Recoveries from the winter period (December – February) are mainly reported from western Europe, including Denmark and Germany, and smaller numbers also in central and southeastern Europe as well as in Turkey. The return migration of the White-fronted Goose starts in March with recoveries being spread eastwards in Europe. In April a large number of recoveries is reported from Belarus and western Russia continuing north in May. In June the birds are found in the breeding area close to the Arctic coast. A small number of recoveries is found in May close to the border of Kazakhstan and they are probably from birds heading for breeding sites on Taymyr Peninsula, where some recoveries are found during the breeding season. Birds of the Greenland breeding form, A. a. flavirostris start to appear on Iceland in April and in May recoveries are reported from southeastern Greenland.

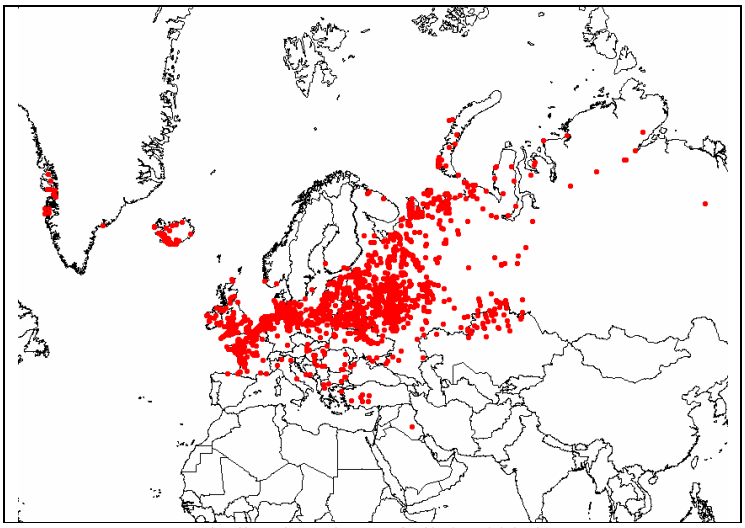
Autumn migration from northern Russia starts in August and continues until October. The route followed is more to the north then during spring and birds pass through the Baltic. In September and October recoveries are found in northern Kazakhstan and this probably involves birds from breeding areas on Taymyr on their way to wintering sites in southeastern Europe and Turkey. Birds breeding in Greenland are found on stopover in Iceland until November and they winter mainly in Scotland & Ireland. North Siberian breeders are also found in the Caspian Sea area and in Iraq, while birds from breeding sites further east winter in south and East Asia.

Table 2.16: Summary of movements of Greater White-fronted Goose *Anser albifrons* from literature based on published information and ring recoveries in EURING Data Bank.

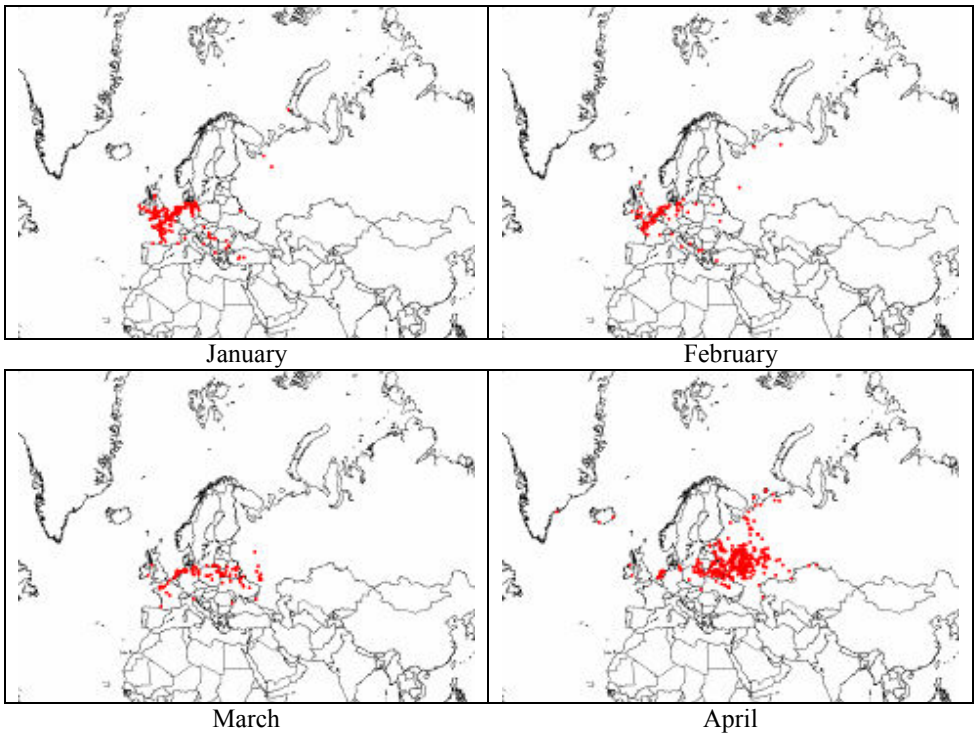
Greater white-fronted goose **Anser albifrons**

Distribution: Holarctic, at high latitudes in northern Europe, Asia and North America

Population (or part of population)	Autumn Migration		Wintering / Non-breeding Grounds		Spring Migration		References
	direction / via	during	location	during	direction / via	during	
Two subspecies: nominate form *Anser albifrons albifrons* in Arctic tundra , *A. a. flavirostris* exclusively in low Arctic areas of west Greenland from 63° to 72°N.			no overlap of range or migration routes between *flavirostris* and *albifrons*		Spring migration tracks probably a bit more south than autumn migration		3, 8
Greenland (*A.a. flavirostris*)	via S- and W-Iceland, S	end Aug-Sep-Oct	Britain, Ireland, few Denmark, Netherlands, Norway		staging in Scotland	mid Apr-May	1, 5, 2, 8, 9
Western and Central Siberia	Denmark, Finland	Sep-Oct	Northwest and central Europe; N-Spain, France, Great Britain, Belgium, Netherlands, Denmark, Germany, Poland the Baltics, Finland, S-Sweden		Netherlands	Mar	1, 3, 2, 8
Arctic breeding grounds	via SW-Siberia		Southern North Sea, SW Baltic Sea			Feb-Mar	2, 5, 12
Western and Central Siberia ("Panonic population")	Austria, Hungary	Oct-Nov	Hungary, Austria, former Yugoslavia, N-Italy, Albania, N-Greece			Feb-Mar	1
N-Siberia ("Anatolian population")			Black Sea, Danube Delta, West coast Turkey, NE-Greece, central Turkey				1, 3
Northern European Russia							
Taymyr	via Kazakhstan, SW-Siberia, W-SW		Western Black Sea, probably Turkey				3, 8, 12
N-Siberia			Caspian region, Iraq				1, 3, 8
East palaearctic group	SE		South and East Asia				3



Finding locations of all dead birds



January February

March April

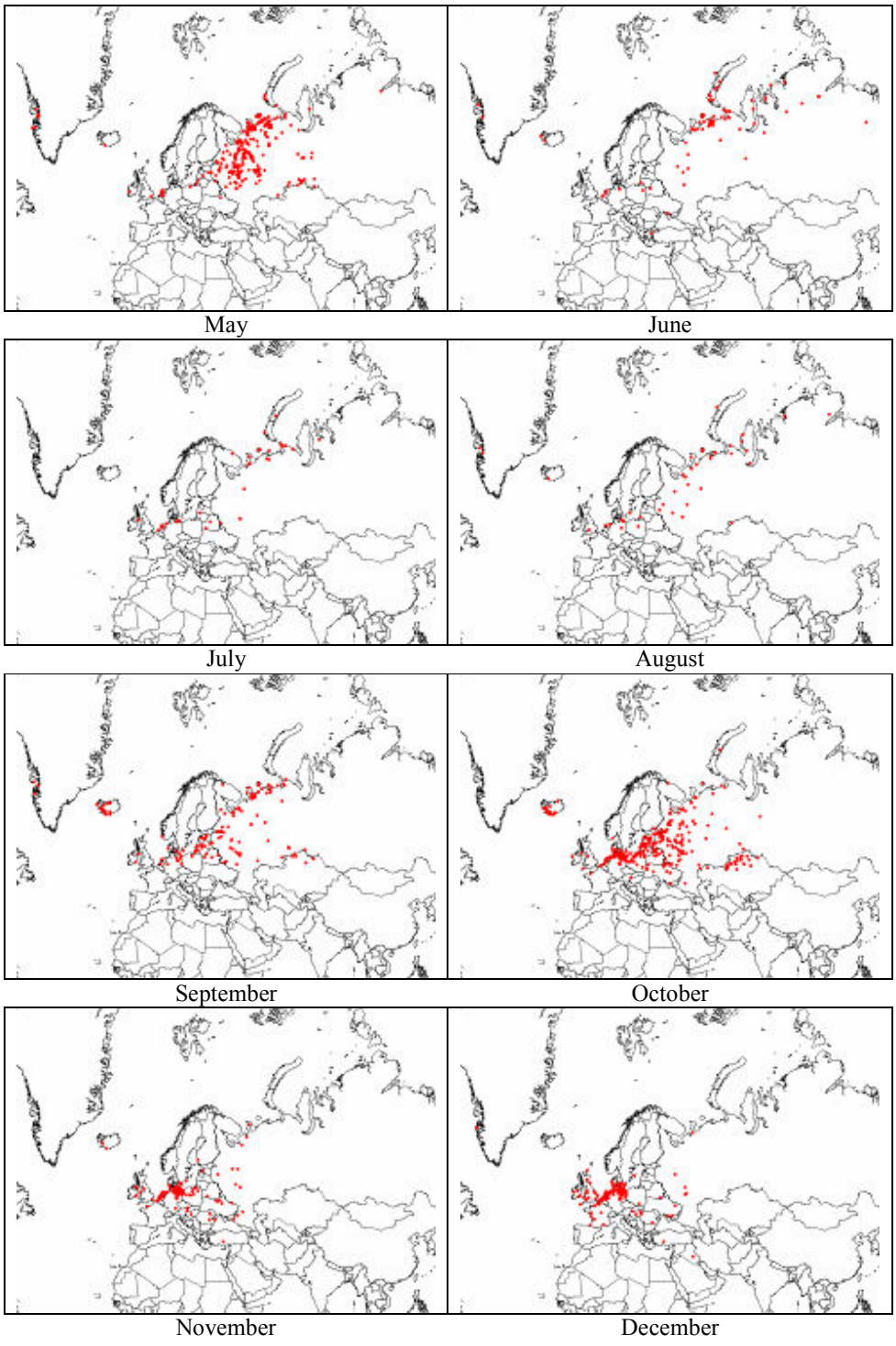


Figure 2.12: Finding locations of all dead Greater White-fronted Goose *Anser albifrons* in the EURING data bank. All birds are presented and also broken down by month.

2.10 Greylag Goose (*Anser anser*)

2.10.1 Numbers and distribution

Greylag Goose has a complex population structure in Europe and many countries have non-migratory populations which are joined by migrants on passage and in winter. Denmark, The Netherlands, Spain, the UK, Germany and Hungary hold large wintering populations. This is a numerous species in Central Asia and Iran, with important breeding and staging sites in Kazakhstan, and wintering sites in Uzbekistan, Turkmenistan and especially Iran.

The highest counts of Greylag Geese have been made at sites in Russia and Kazakhstan (Table 2.9). 100,000 have been recorded staging at the Stepnoi State Refuge, and 50,000 at the Svir Delta in Russia, and 70,000 were counted at Sholack Lake, Kazakhstan in January 1995. Large numbers winter in Spain, where 43,521 at The Doñana National Park 1n 1995 and 39,296 at Lagunas de Vilafafila in 1999 are high recent count totals. Iran has more records of important concentrations of Greylag Geese than other countries with 48,100 at Fereydoon Kenar in 2003 by far the highest count, followed by 12,700 at Varamin Lake in 1997. In Northern Europe, 57,104 at Westerschelde and Saeftinge, The Netherlands in 1999, 22,710 at Filso Lake, Denmark in 1996 and 19,150 at Loch of Skene, Scotland in 1991 are typical high counts. In central and eastern Europe, 22,000 were counted at Fulupszallas Szikes To, Hungary, in 1995, and 21,822 at the Danube Delta, Romania in 1992. There are important winter concentrations in North Africa, where Lac Fetzara, Algeria, held 13,400 in January 1994.

Table 2.17: Greylag Goose *Anser anser*: Peak counts between 1990 and 2005 at sites in Europe, Africa West and Central Asia where 2,500 or more have been recorded.

Country	Sitename	Year	Count	Type	Ref.
Algeria	Lac Fetzara	1994	13400	J	17
Algeria	Marais De Mekhada	1991	7140	J	17
Austria	Neusiedlersee. Seewinkel; Hansag	1995	12785	J	17
Azerbaijan	Caspian Coast: Gyzylagach Nature Reserve		19200	J	17
Azerbaijan	Kirov Bay	1991	6040	J	17
Belgium	Polders Achterhaven Zeebrugge-Lissewege	2001	3851	J	17
Belgium	Verrebroekpolder Verrebroek	2002	3111	J	17
Denmark	Filso Lake + Fields	1996	22710	J	17
Denmark	Basnæs Cove	1993	13000	J	17
Denmark	Ålvand Klithede	1999	8150	J	17
Denmark	Rosvang	1998	6500	J	17
Denmark	Maribo Lakes	1991	6150	J	17
Denmark	Bloden. Riso	2000	4725	J	17
Denmark	Tisso Lake	1994	4625	J	17
Denmark	Gjorslev	1992	4400	J	17
Denmark	Margrethe Kog	1998	4079	J	17
Denmark	Tonder Marshes	1999	3555	J	17
Denmark	Vejlerne	2000	3463	J	17
Denmark	Nissum Fjord	1996	3300	J	17
Denmark	Vest Stadil Fjord	1993	3150	J	17
Denmark	Borreby Marsh	2000	3100	J	17
Denmark	Tandrup + Ove Lake	2000	2800	J	17

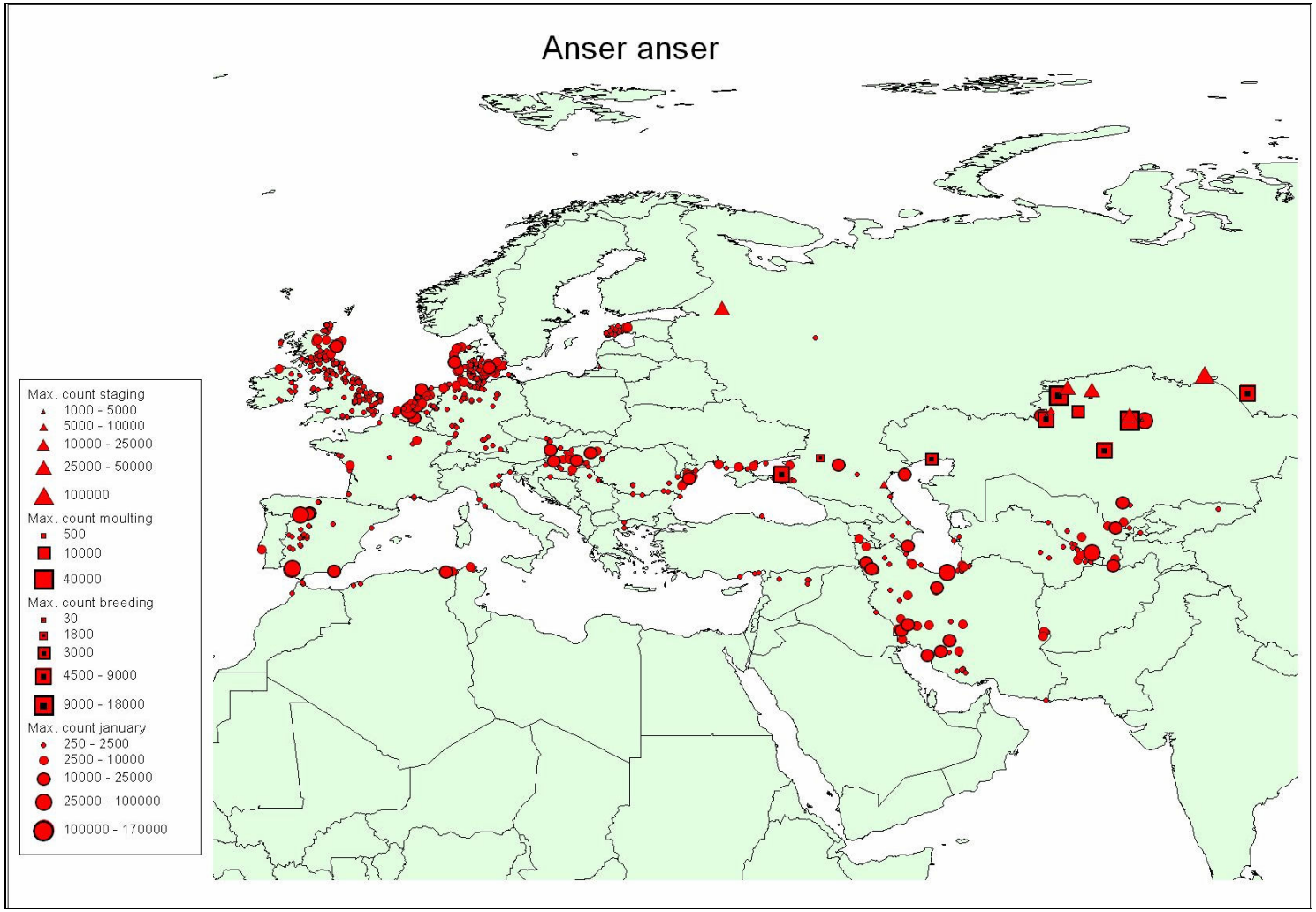


Figure 2.13: Greylag Goose *Anser anser*: Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 250 or more have been recorded.

Table 2.17 continued: Greylag Goose *Anser anser*

Country	Sitename	Year	Count	Type	Ref.
Denmark	Danish Wadden Sea	2002	2771	J	17
Denmark	Fladet & Kallogrå	1999	2750	J	17
Denmark	Boto Cove + Surroundings	1992	2627	J	17
Denmark	Gisselfeld/Bregentved Lakes	2000	2625	J	17
Denmark	Nakskov Fiord	2000	2535	J	17
Estonia	Raana	1995	4150	J	17
Estonia	Haeska	1992	3900	J	17
Estonia	Kloostri	1993	2800	J	17
Estonia	Vohilaid	1991	2500	J	17
France	Baie De L'Aiguillon Et Pointe D'Arcay	2003	5360	J	17
France	Lac Du Der-Chantecoq (51 / 52)	2004	3043	J	17
Germany	Wattenmeer SH 14	1997	3327	J	17
Germany	Dollart	1990	3177	J	17
Germany	Vorland Butjadingen	1998	2970	J	17
Germany	Wattenmeer SH 13	1992	2504	J	17
Hungary	Fulupszallas Szikes To = Kelemenszek K	1995	22000	J	17
Hungary	Kiskondas Halasto	1999	16000	J	17
Hungary	Kisbalaton `Regi`	2002	12700	J	17
Hungary	Fertó Tó (Lake Fertó)	1994	11484	J	17
Hungary	Szabadszallas Szikes To = Kisret. Zabsze	1998	9400	J	17
Hungary	Kisbalaton Tarozo	2002	7300	J	17
Hungary	Hortobagy Halasto	1999	6410	J	17
Hungary	Sarbogard Halasto	2000	6000	J	17
Hungary	Retszilas Halasto	2000	5315	J	17
Hungary	Duna / Karapancsa	1998	4000	J	17
Hungary	Velencei To	1997	3100	J	17
Hungary	Balaton: Siofok	1999	3000	J	17
Hungary	Soponyai-Halastavak	2000	2500	J	17
Iran	Fereydoon Kenar, Ezbaran & Sorkh Rud Dam	2003	48100	J	17
Iran	Varamin Lake	1997	12700	J	17
Iran	Kaftar Lake	1997	11500	J	17
Iran	Garros Marsh	1994	11450	J	17
Iran	Helleh River: River And Delta	1998	11091	J	17
Iran	Dasht-E-Arjan Marsh	1997	10517	J	17
Iran	Urmiyeh (Uromiyeh) Lake: West Marshes	1993	10442	J	17
Iran	Dasht-E-Shoeybieh (Near Ahvaz)	1990	10076	J	17
Iran	Hamidieh Grassland	1994	10052	J	17
Iran	Urmiyeh (Uromiyeh) Lake: Southern Coast	1993	9150	J	17
Iran	Gomishan Marsh	1995	8500	J	17
Iran	Zargan Plain	1990	7500	J	17
Iran	Aras River: Bralan - Aras Dam	1997	7000	J	17
Iran	Gopy Lake	1991	7000	J	17
Iran	Kaniborazan	1995	7000	J	17
Iran	Shadegan Marshes Protected Region: Total	2003	6360	J	17
Iran	Sorkhrood Damgah	1998	6000	J	17
Iran	Anzali Mordab Complex: Selkeh Protected	2003	5400	J	17
Iran	Dez Dam Complex: Dez Dam And Dez River	1991	4500	J	17
Iran	Urmiyeh (Uromiyeh) Lake:: Total	1990	4498	J	17
Iran	Urmiyeh (Uromiyeh) Lake: Ghareh-Gheshlag	1993	4379	J	17
Iran	Bakhtegan & Tashk Lakes	1991	4346	J	17
Iran	Urmiyeh (Uromiyeh) Lake: Gerdeh Ghit & M	1994	4000	J	17
Iran	Hamoun Lakes Complex: Kuh-I-Khajeh	1993	3956	J	17
Iran	Hamoun Lakes Complex: Hamoun-E-Saberi	1994	3779	J	17
Iran	Agh Gol Marsh	1994	3605	J	17
Iran	Miangaran Marshes: Miangaran & Izeh Mars	1994	3565	J	17
Iran	Changiz Marsh	1994	3500	J	17

Table 2.17 continued: Greylag Goose *Anser anser*

Country	Sitename	Year	Count	Type	Ref.
Iran	Miangaran Marshes: Izeh & Shiekhon (Band	1991	3500	J	17
Iran	Parishan Lake	1990	3450	J	17
Iran	Gharaso (Boralan) Marsh	1993	3400	J	17
Iran	Band Ali Khan Complex: Band-Ali Khan	1998	3000	J	17
Iran	Shur Gol / Hassanlu	1994	3000	J	17
Iran	Anzali Mordab Complex: Anzali Mars West	2003	2750	J	17
Iran	Chookam Ab-Bandan	2003	2750	J	17
Iran	Caspian Sea Coast (Mazandaran): Bandar T	1990	2703	J	17
Iran	Choghakhor Marsh	2003	2650	J	17
Iran	Dasht-E-Azadegan: Susangerd-Howeizeh-Bos	1993	2540	J	17
Iran	Horeh Bamdej Marshes: Horeh Bamdej Marsh	1991	2500	J	17
Iran	Yadegarlo Lake	1994	2500	J	17
Ireland	Lough Swilly: Total	2001	3008	J	17
Kazakhstan	Tobol-Ishim-Kurgaljin wetlands		9400	B	40
Kazakhstan	Central Kazakhstan wetlands		8600	B	40
Kazakhstan	Irgyz-Turgay-Sarykopa wetlands		5200	B	40
Kazakhstan	Ural-Caspian wetlands		3000	B	40
Kazakhstan	Sholack Lake	1995	70000	J	17
Kazakhstan	Chuchkakol Lakes	2004	18700	J	17
Kazakhstan	Chardara Vdchr	1992	8000	J	17
Kazakhstan	Kurgaljin NR		40000	M	40
Kazakhstan	Naurzum NR		10000	M	40
Kazakhstan	Lakes of Kustanai region total	2003	42545	S	39
Kazakhstan	Lake Bozshakol	1997	36000	S	4
Kazakhstan	Small lakes north of Kurgaljin NR	1999	28000	S	16
Kazakhstan	Kulykol Lake, Kustanay reg.	1999	6900	S	16
Kazakhstan	Ayke Lake, Kustanay reg.	1999	4800	S	16
Kazakhstan	Koybagar & Tyuntyugur Lakes, Kustanay re	1999	4580	S	16
Netherlands	Westerschelde & Saeftinge	1999	57104	J	17
Netherlands	Waddenzee	2000	14970	J	17
Netherlands	Grensmaas	2004	13763	J	17
Netherlands	Biesbosch	2001	8791	J	17
Netherlands	Haringvliet	2001	8252	J	17
Netherlands	Waal: Waardenburg - Werkendam	2002	8220	J	17
Netherlands	Gelderse Poort	2003	6492	J	17
Netherlands	IJssel	2004	6154	J	17
Netherlands	Nederrijn: Heteren - Wijk bij Duurstede	2004	4342	J	17
Netherlands	Oosterschelde	2004	3891	J	17
Netherlands	Volkerakmeer	2001	3846	J	17
Netherlands	Ketelmeer & Vossemeer	2004	3219	J	17
Netherlands	De Wieden	2003	3191	J	17
Netherlands	Getijde-beinvloede Maas	2004	2873	J	17
Netherlands	Lek: Wijk bij Duurstede - Schoonhoven	2004	2848	J	17
Netherlands	Oostvaardersplassen	1991	2692	J	17
Netherlands	Midden-Delfland en Oude-Leede	2004	2627	J	17
Portugal	Estuário Do Tejo	1999	4352	J	17
Romania	Delta Dunarii (Danube Delta)	1992	21822	J	17
Romania	Lake Istria	1994	6600	J	17
Romania	Gr. Lupilor	1996	2900	J	17
Romania	Lake Murighiol	1999	2500	J	17
Romania	Martinca	1994	2500	J	17
Russia	Kuban Delta	2000	6000	B	11+12
Russia	Kulunda Lakes		4500	B	25
Russia	Lakes of South Ural region		25000	J	15
Russia	Volga Delta		18000	J	17
Russia	Lake Manych-Gudilo		12000	J	17

Table 2.17 continued: Greylag Goose *Anser anser*

Country	Sitename	Year	Count	Type	Ref.
Russia	Beisugsky Liman and Lake Khanskoye		2795	J	17
Russia	Stepnoi State Refuge		100000	S	33
Russia	Svir Delta		50000	S	23
Russia	Kyzlyar Bay		10000	S	7
Russia	Neman River delta		4000	S	35
Spain	Parque Nacional De Doñana (Consolidation	1995	43521	J	17
Spain	Lagunas De Villafáfila (Za)	1999	39296	J	17
Spain	Marisma De Hinojos (H)	2001	27200	J	17
Spain	Lucio De Los Ansares (Se)	2003	20474	J	17
Spain	Del Palacio A La Algaida (H)	2000	18970	J	17
Spain	Laguna De Boada	2003	18200	J	17
Spain	Los Pobres. Lucios De Beta La Plama (Con	1996	16638	J	17
Spain	De La Algaida A Hato Villa (H)	1995	16500	J	17
Spain	Laguna De La Nava De Fuentes	2001	13600	J	17
Spain	Caño Del Guadiamar Pnd (H)	1994	13500	J	17
Spain	Coto Del Rey (Consolidated)	1996	13028	J	17
Spain	Lucios De Beta La Palma-Isla Mayor (Se)	1999	6760	J	17
Spain	Caño Travieso (Se)	1992	5700	J	17
Spain	Guadiamar Encauzado (H)	1993	4550	J	17
Spain	Charcas De Castropepe Y Paradores (Za)	1998	3680	J	17
Spain	Embalse Del Esla -Ricobayo- (Za)	1992	2502	J	17
Tunisia	Lac Ichkeul	1992	8625	J	17
Turkmenistan	Amudarya Valley: Kerki-Karabekaul	1994	3760	J	17
Turkmenistan	Kelif Floodlands (Formerly Kelif Lakes)	1993	2969	J	17
Ukraine	Secondary Delta Of The Kiliya Channel (D	2000	4480	J	17
Ukraine	Stencovskie Plavny	1999	3750	J	17
Ukraine	Utl'Ukskij Liman	1991	2850	J	17
Ukraine	Black Sea State Biosphere Reserve	1990	2758	J	17
Ukraine	Danube Delta	1996	2700	J	17
Ukraine	E. Sivash	1998	2554	J	17
United Kingdom	Loch Of Skene	1991	19150	J	17
United Kingdom	Loch Spynie	1995	3900	J	17
United Kingdom	Cromarty Firth	2002	3546	J	17
United Kingdom	Dornoch Firth Consolidated	2001	3339	J	17
United Kingdom	Inner Moray And Inverness Firth	1991	3205	J	17
United Kingdom	Haddo House Lakes	1993	3000	J	17
United Kingdom	Loch Of Strathbeg	1990	2700	J	17
United Kingdom	Abberton Reservoir	2002	2500	J	17

2.10.2 Greylag Goose movements

The Greylag Goose breeds locally in a large area of Europe, except for the southwestern part, and across central Asia. Two subspecies are present in Europe, the nominate form in the west and *A. a. rubrirostris* in southeastern Europe. Six populations are recognized within Europe and feral populations are also found in several areas. Populations in the north and east are wholly migratory, while some populations further south are resident.

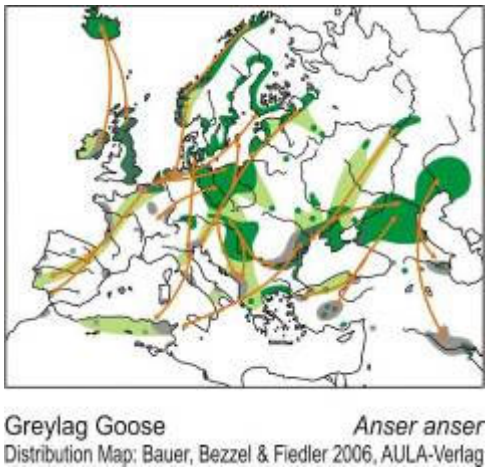


Figure 2.14: Map depicting the movements of Greylag Goose *Anser anser* based on published information and ring recoveries in the EURING Data Bank.

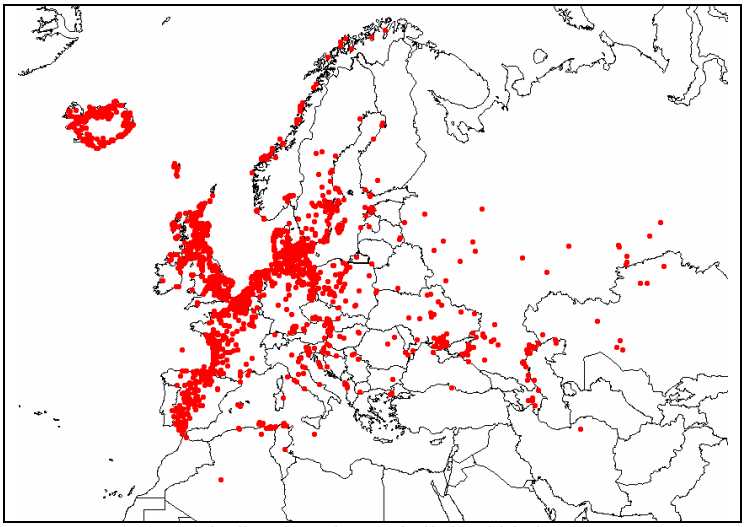
Largest numbers of recoveries are from Greylag Geese ringed in Denmark, Britain and Sweden. The recoveries reported during winter are found in western and southern Europe, in northern Africa and a few in the area of the Black and Caspian Seas. Return migration starts early, already in January, and continues until April. During the breeding season, recoveries are spread out, including Iceland, coast of Norway, southern Sweden, Ukraine, southern Russia and Kazakhstan. Autumn migration commences late and recoveries start to appear in southwestern Europe in October. In November, the Greylag Goose has left Iceland, the numbers found in North Africa increase and recoveries in the east are found close to the northern part of the Black Sea and west of marismas of the Caspian Sea. The southwest flyway is narrow and follows the Atlantic coast in France, cross the Iberian Peninsula to marismas of the Guadalquivir in southern Spain. Birds breeding in Britain are resident, while birds from Iceland winter mainly in Scotland. Breeding birds from Norway, Sweden, Denmark and western Germany migrate SW to Spain, but an increasing number have remained during winter in the Netherlands and France since the mid 1980s. Many Greylag Geese from eastern Sweden, Finland and east central Europe migrate south and winter in Italy, the Balkans and in North Africa (Algeria and Tunisia). Birds from the Black Sea region and Turkey show limited movements to coastal areas. Breeding birds from areas north of the Caspian Sea and in western Siberia move south to areas including Pakistan and India. Moult migration in non-breeders involves movements from central Europe to the Baltic, Denmark and the Netherlands.

Table 2.18: Summary of the movements of Greylag Goose *Anser anser* from the literature based on published information and ring recoveries in the EURING Data Bank.

Greylag goose ***Anser anser***

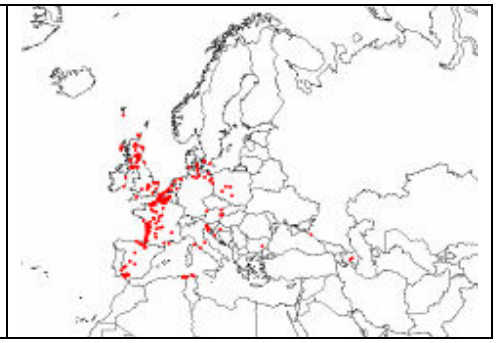
Distribution: Palaearctic, across Europe and Asia. Two subspecies: nominate form *Anser a. anser* from west and northwest Europe, *A. a. rubrirostris* from southeast Europe and Asia (both subspecies occur in Western Eurasia). Six populations recognized: 1. Iceland; 2. residents breeding in NW-Scotland; 3. Norway, Sweden, Denmark and western Germany; 4. NE-Sweden, Finland, the Baltic States and central Europe; 5. Black Sea region and Turkey; 6.Western Siberia south to Caspian region

Population (or part of population)	Autumn Migration		Wintering / Non-breeding Grounds		Spring Migration		References
	direction / via	during	location	during	direction / via	during	
West of Urals (*A. a. anser*)			throughout southern and western Europe, south to North Africa (Morocco, Tunisia)				8
Iceland			Scotland, few N-England and Ireland				1, 3, 8
NW-Scotland			(sedentary)				
Norway, Sweden, Denmark, western Germany	via Netherlands, along North Sea and Alantic coast, some inland to N-Africa	Sep (Netherlands: Oct-Nov)	(mainly sedentary): Spain, France, some remain in delta region of Netherlands, N-Germany. At least for Swedish birds numbers staying in the Netherlands during winter incresed in last two decades			Jan-Feb	1, 2, 8, 9
Denmark	Concentrated SW	Sep-Oct	S-Sweden, Denmark, Germany, Netherlands, Belgium, France, Southern Spain, Switzerland, Italy, N-Africa	Oct-Nov	same route as in autumn		
Eastern Baltic, central Europe, Poland, Czech Republic, Slovak Republic, Austria, Finland, E-Sweden	via Balkans, Italy , SW, via Denmark	Aug-Sep	Netherlands, Poland, Denmark, Belgium, Germany, France, Spain, Czech Rep., Slovak Rep., NE-Mediterranean region, North Africa: Lake Ichkeul in Tunisia, Marais de Mekhada and Lake Fetzara in Algeria, Italy		same route as in autumn	Jan-Mar	1, 2, 3, 5, 6, 8, 9, 12
Black Sea region, Turkey	Sedentary		(sedentary; limited movements to) coastal regions				8
SW-Siberia			Kazakhstan, Caspian region				
Russia	S-SW		Black Sea, TR, Caspian region				
Small number of birds from extreme eastern Turkey, NW-Iran			(largely sedentary); may join larger flocks from the North				8
The Urals, southeast Europe, the Pannonic region, Turkey east across Asia. *A. a. rubrirostris*.			Black Sea, Caspian region south to southern Iran, Iraq, in Tunisia/Algeria, rarely Egypt (few to Belgium, Netherlands, Germany, Switzerland)				
A. rubrirostris in north Caspian and western Siberia			south Caspian, Iran, Iraq, into Pakistan and India				3, 8, 11

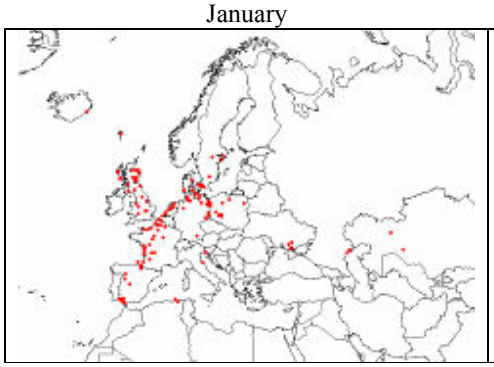


Finding locations of all dead birds

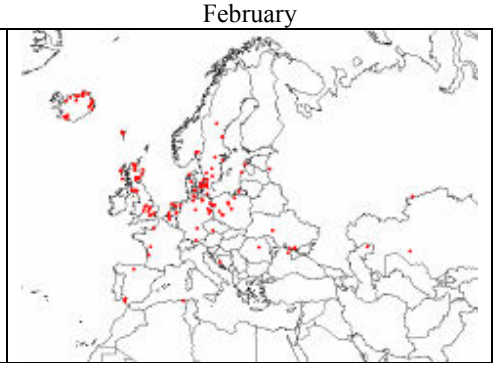
January



February



March



April

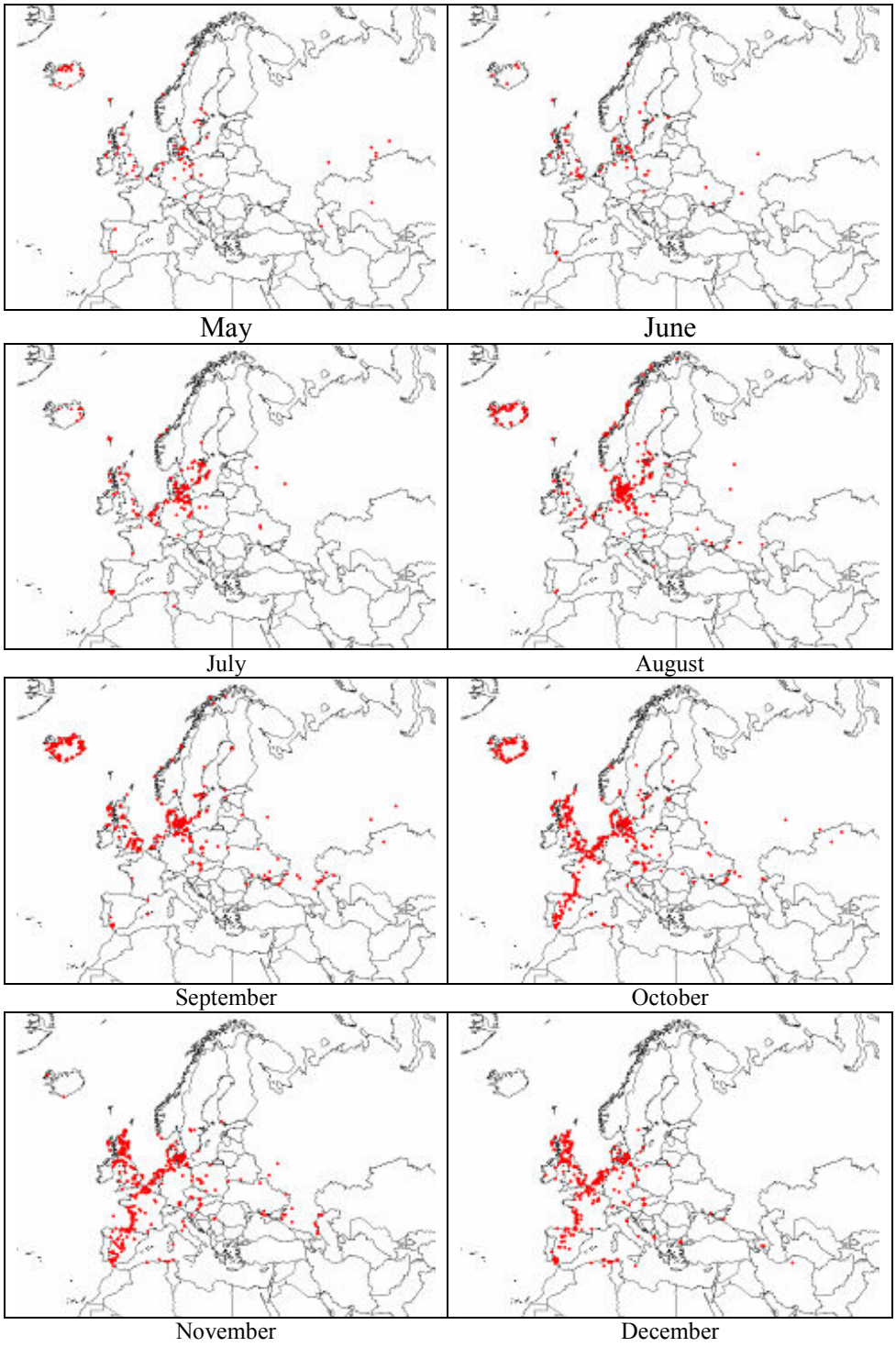


Figure 2.15: Finding locations of all dead Greylag Geese *Anser anser* in the EURING data bank. All birds are presented and also broken down by month.

2.11 Red-breasted Goose (*Branta ruficollis*)

2.11.1 Numbers and distribution

Red-breasted Goose has a geographically restricted range. It breeds on the Taymyr Peninsula and winters on the Black Sea lowlands of Bulgaria, Romania and Ukraine (Figure 2.16). The range extends into the European Union in eastern Greece. Important staging areas have been identified in Kazakhstan.

The most important recorded sites for wintering Red-breasted Goose are in Bulgaria, where 55,845 were counted at the Shabla Lake complex in January 1993, 17,733 at Durankulak Lake in January 2000 and 16,860 at Mandra Lake in January 1997 (Table 2.19). In Ukraine, 13,500 were recorded in the Central Sivash in 2000 and 12,000 at Dnievstrovsky Liman in 2001. In Romania, highest recorded counts are 10,000 at Techirgiol in 1999 and 8,000 in the Danube Delta in 1993. The Kustanay Region of Kazakhstan is a crucial autumn staging area, where the highest single count was 19,600 at Kulykol Lake in 1999. The key site in the European Union is the Evros Delta, Greece, where 750 were counted in 1997.

Table 2.19: Red-breasted Goose *Branta ruficollis*: Peak counts between 1990 and 2005 at sites in Europe, West and Central Asia where 10 or more have been recorded.

Country	Sitename	Year	Count	Type	Ref.
Azerbaijan	Caspian Coast: Gyzylagach Nature Reserve		340	J	17
Bulgaria	Shabla Lake Complex	1993	55845	J	17
Bulgaria	Durankulak Lake Complex	2000	17733	J	17
Bulgaria	Mandra Lake	1997	16860	J	17
Bulgaria	Danube: Tutrakan-Silistra Toutrakan - Silistra	1998	1734	J	17
Bulgaria	Burgas Lake (Vaya)	1997	860	J	17
Bulgaria	Tzerkovski Tserkovski Reservoir	1997	450	J	17
Bulgaria	Atanasovo Lake Complex	1997	380	J	17
Bulgaria	Danube: Other Sites	1996	77	J	17
Bulgaria	Black Sea Coast: Tulenevo	1993	71	J	17
Bulgaria	Black Sea Coast: Kaliakra-Kamen Brjag Bryag -Tulenovo Tyulenovo	1998	59	J	17
Bulgaria	Black Sea Coast: Kavarna-Balchik-Kranevo	1999	48	J	17
Bulgaria	Tzonevo Reservoir	1997	14	J	17
Bulgaria	Piasachnik Reservoir	1997	12	J	17
Bulgaria	Black Sea Coast: Kraimorie-Tchernomoretz Kraymorie-Chernomorets	1997	10	J	17
Greece	Evros Delta	1997	750	J	17
Greece	Kerkini	1997	18	J	17
Hungary	Szabadszallas Szikes To = Kisret. Zabszek Knp	2000	33	J	17
Hungary	Dinnyes Ferto	2000	25	J	17
Hungary	Fulupszallas Szikes To = Kelemenszek Knp	2000	23	J	17
Hungary	Geszt. Begecsi Halastavak	2001	12	J	17
Iran	Gavekhoni Marsh	1994	750	J	17
Iran	Tajan River And Sarrakakhs Fishpond: Tajan River	1997	130	J	17
Iran	Dasht-E-Moseian	1997	91	J	17

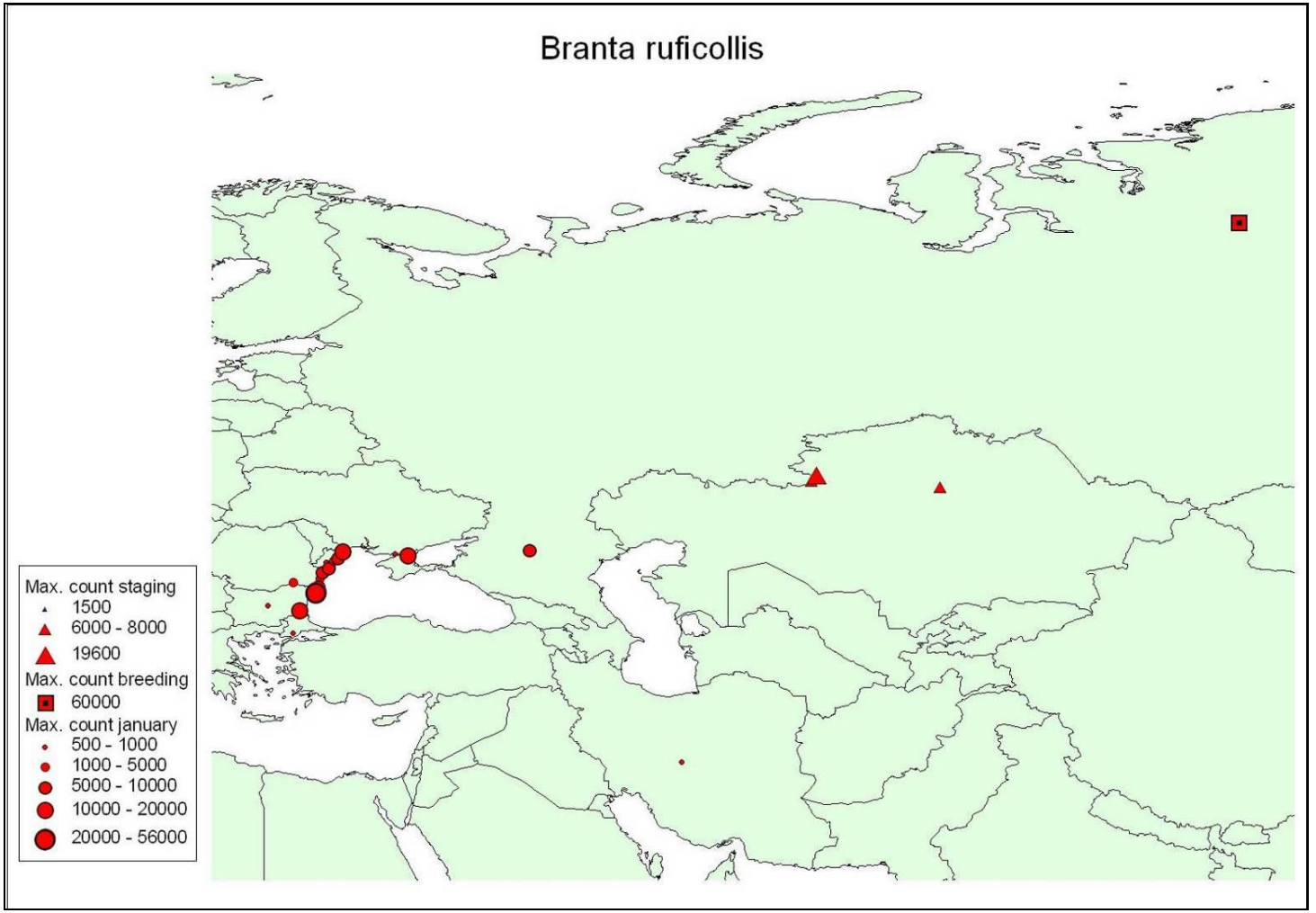


Figure 2.16: Red-breasted Goose *Branta ruficollis* Peak counts between 1990 and 2005 at sites in Europe, West and Central Asia where 500 or more have been recorded.

Table 2.19 continued: Red-breasted Goose *Branta ruficollis*

Country	Sitename	Year	Count	Type	Ref.
Iran	Dasht-E Akbar	1997	87	J	17
Iran	Urmiyeh (Uromiyeh) Lake: Ghareh-Gheshlagh Marsh	2003	12	J	17
Iran	River Dowereg	2003	10	J	17
Kazakhstan	Kulykol Lake, Kustanay reg.	1999	19600	S	16
Kazakhstan	Koybagar & Tyuntyugur Lakes, Kustanay reg.	1999	13800	S	16
Kazakhstan	Small lakes west of Kurgaljin NR	1999	7600	S	16
Kazakhstan	Ayke Lake, Kustanay reg.	1999	6100	S	16
Kazakhstan	Batpakkol Lake, Kustanay reg.	1999	1500	S	16
Romania	Techirghiol	1999	10000	J	17
Romania	Delta Dunarii (Danube Delta)	1993	8349	J	17
Romania	Lake Razelm	1992	8300	J	17
Romania	Lake Sinoe (= Sinoie)	1992	2000	J	17
Romania	Lakes Nuntasi And Tuzla	1999	620	J	17
Romania	Razelm Ne	1994	600	J	17
Romania	Lake Sinoe South	1991	300	J	17
Romania	Razelm Nw	1999	300	J	17
Romania	Lake Strachina	1999	188	J	17
Romania	Leahova-Periteasca	1999	150	J	17
Romania	Lake Murighiol	1994	85	J	17
Romania	Babita (Babina)	1999	30	J	17
Romania	Mahmudia	1999	30	J	17
Romania	Tasaul	1999	18	J	17
Romania	Golovita (Bisericuta-Gr. Lupilor)	1992	10	J	17
Russia	Taymyr, Gydan and Yamal Peninsulas: entire world population		60000	B	37
Russia	Lake Manych-Gudilo	2003	7000	J	17
Turkmenistan	Amudarya Valley: Kerki-Karabekaul	1991	48	J	17
Ukraine	M. Sivash	2000	13500	J	17
Ukraine	Dniestrovskiy Liman	2001	12000	J	17
Ukraine	Dzansheisky. Shagany; Alibey; Burnas Limans	1998	7000	J	17
Ukraine	Sasyk Liman + Adjacent Sea Area	1995	2000	J	17
Ukraine	Budaksky + Gribovsky Limans	1998	1500	J	17
Ukraine	Lake Kitai	1995	1000	J	17
Ukraine	Stencovskie Plavny	1999	815	J	17
Ukraine	E. Sivash	2000	630	J	17
Ukraine	Lakes Kagul.Kugurlui And Ialpug	1998	150	J	17
Ukraine	Dnester Delta + Liman	1998	100	J	17
Ukraine	Black Sea State Biosphere Reserve	1990	86	J	17
Ukraine	Dnepro-Bugsky (Dneprovskij) Liman	1998	80	J	17
Ukraine	Dzharylhatskyj Bay Area Iv	2000	75	J	17
Ukraine	Kuyalnitsky Liman	1998	60	J	17
Ukraine	Danube Delta	1998	55	J	17
Ukraine	Area Northeast Of Odessa	1998	30	J	17
Ukraine	Khadzibeisky Liman	1998	20	J	17
Ukraine	Utl'Ukskij Liman	1991	12	J	17

2.11.2 Red-breasted Goose movements

This species breeds in a limited area of northern Russia, mainly on the Taymyr, Gydan and Yamal peninsulas. It has a very restricted wintering range and has because of this been classified on the IUCN Red List as Vulnerable.

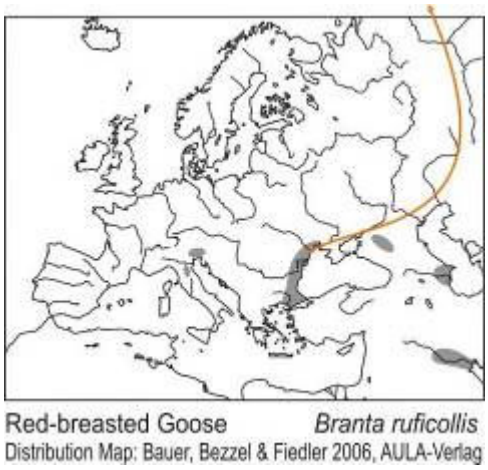


Figure 2.17: Map depicting the movements of Red-breasted Goose *Branta ruficollis* based on published information and ring recoveries in the EURING Data Bank.

The Red-breasted Goose has been ringed in very low numbers within Europe. Only four recoveries are available and one of these, ringed in the Netherlands, has been reported as shot on Yamal. The species changed its wintering range from about the 1960s from Azerbaijan westwards to the Black Sea coast in Romania and Bulgaria. Small numbers of birds also winter in Ukraine and northern Greece, in the latter area often in connection with hard weather. During recent years, a few birds are reported from Comaccio/Venice area in northern Italy almost annually. It is believed that the majority of the population nowadays winter in the Black Sea area. The autumn migration follows narrow routes southwest through Russia along rivers to the area north of the Caspian Sea and then westward to the Black Sea. Several staging areas are used during spring migration in Ukraine, Russia and Kazakhstan. Stragglers are regularly found in western Europe and the number observed seems to have increased after the shift in wintering areas.

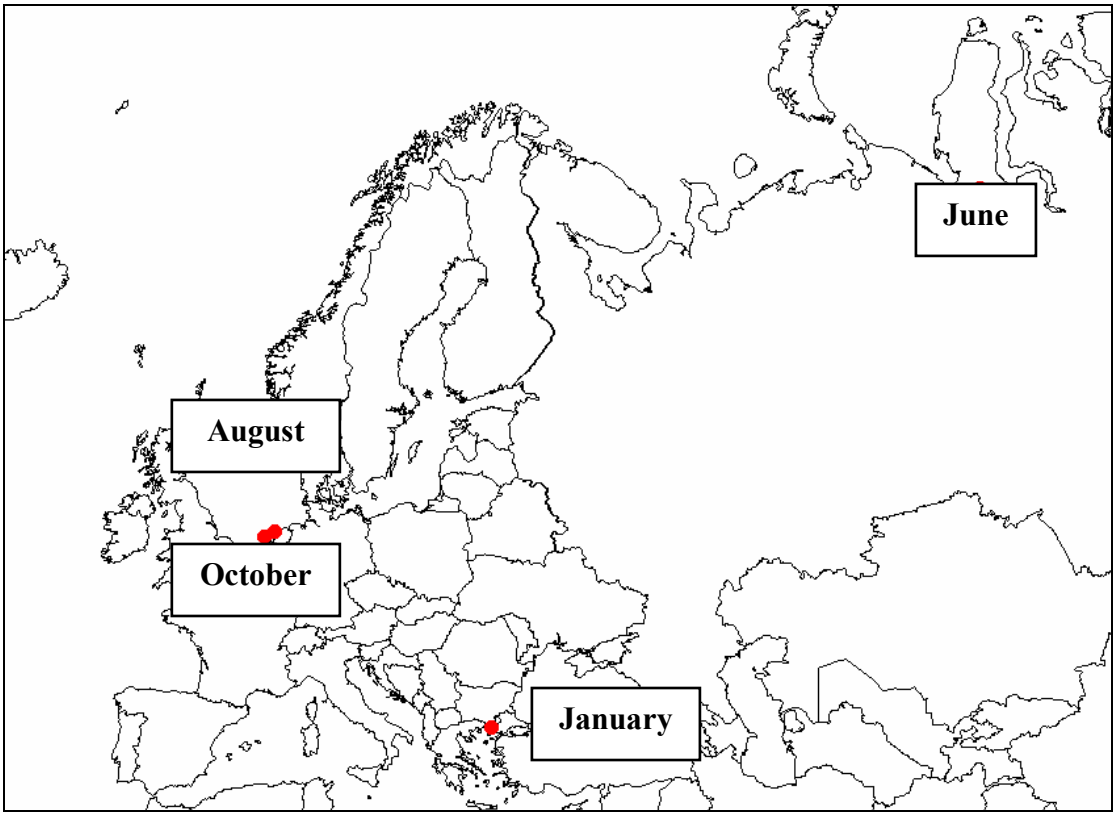


Figure 2.18: Finding locations of all dead Red-breasted Goose *Branta ruficollis* in the EURING data bank. All birds are presented and also broken down by month

2.12 Eurasian Wigeon (*Anas penelope*)

2.12.1 Numbers and distribution

Eurasian Wigeon winters in high numbers in The Netherlands, which forms the core of the most important belt of winter distribution which includes Denmark, Germany, Belgium, The UK and Ireland (Figure 2.19). Important numbers winter in France and there are key concentrations around the Mediterranean in Morocco, Spain, Algeria, Tunisia, Italy, Albania, Greece, Turkey and Egypt. Some of the biggest concentrations occur in Iran, on the Caspian shore and in the southwest. Important staging areas have been identified in Russia and the Baltic states.

A crucial staging area in Russia which includes Lake Ladoga and the eastern Gulf of Finland is detailed in Buzun (2005), who estimates that 500,000 Eurasian Wigeon pass through on migration (Table 2.20). In west Asia, 109,895 were counted at Gyzylagach Bay, Azerbaijan in January 1996. The most important sites in Iran are Fereydoon Kenar and Bakhtegan Lake, where 31,200 were counted in January 1993 and 28,515 in January 1997, respectively. The most important concentration of important sites is in the Low Countries where over 5,000 have been counted at more than 50 sites in The Netherlands, and 9 sites in Belgium. The most important of these is Markermeer, where 86,804 were counted in January 2002. Adjacent parts of Germany also hold high numbers, and four sections of the German Wadden Sea have recorded between 15,000 and 30,000 Eurasian Wigeon since 1990. In the UK, 29 sites have recorded more than 5,000 birds since 1990, the most important being the Ribble Estuary, with 69,149 counted in January 1999. In the Mediterranean region, the highest counts have been made at the Po Delta, Italy, with 62,963 in January 2002, and Lac Ichkeul, Tunisia, where 53,380 were counted in 1997. Greece, Albania and Turkey hold important numbers, with 35,046 at Amvrakikos Wetlands in 1995, 27,198 at Karavasta Complex in 2000, and 27,190 at Yumurtalik Lagoons in 1999. In the West Mediterranean region, Spain holds a number of key concentrations, the highest recent count having been at being Lucio del Membrillo, where 35,000 were counted in 1992. Merja Zerga, Morocco recorded 25,980 in January 1994, and Lac Oubeira, Algeria, 24,420 in the same year.

Table 2.20: Eurasian Wigeon *Anas penelope* Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 4,500 or more have been recorded.

.

Country	Sitename	Year	Count	Type	Ref.
Albania	Karavasta Complex	2000	27198	J	17
Albania	Narta Complex	1997	22200	J	17
Albania	Kune Vain	1995	7146	J	17
Albania	Lalzi Bay	1996	5000	J	17
Algeria	Lac Oubeira	1994	24420	J	17
Algeria	Marais De Mekhada	1998	22392	J	17
Algeria	Barrage De Boughzoul	1991	12000	J	17
Algeria	Lac Tonga	1995	11481	J	17
Algeria	Lac Fetzara	1998	6765	J	17
Algeria	Lac Des Oiseaux	1990	5560	J	17
Algeria	Sebkhet Djendli	1992	5500	J	17
Azerbaijan	Big Kyzyl-Agach Bay, Gyzylagach Nature Reserve	1996	109895	J	17
Azerbaijan	Kirov Bay	1991	61900	J	17

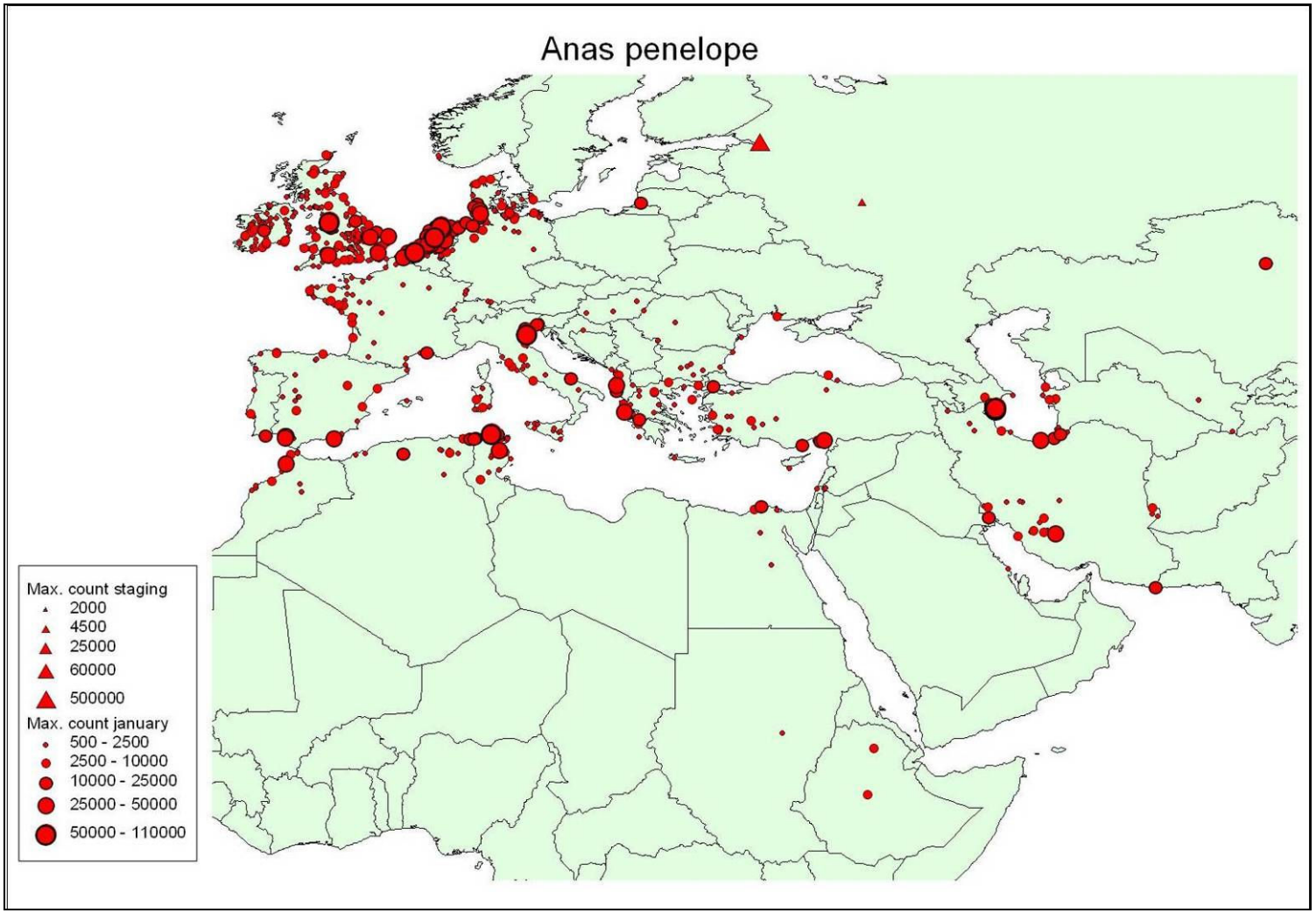


Figure 2.19: Eurasian Wigeon *Anas penelope*: Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 500 or more have been recorded

Table 2.20 continued: Eurasian Wigeon *Anas penelope*

Country	Sitename	Year	Count	Type	Ref.
Azerbaijan	Mahmud-Chala Lake (Third Chala)	1996	19350	J	17
Azerbaijan	Sarysu Lake (Sarasuy)		9911	J	17
Azerbaijan	Little Kyzyl-Agach Bay	1996	4523	J	17
Belgium	Spaarbekken Merkem	1995	29100	J	17
Belgium	Achterhaven Zeebrugge	1997	25302	J	17
Belgium	Blankaart Woumen	2002	9810	J	17
Belgium	Westbroek Lo-Reninge	1994	9750	J	17
Belgium	Kanaaldok Kallo-Doel	2002	7270	J	17
Belgium	Hoge Dijken' Roksem	2001	7250	J	17
Belgium	Ijzerbroeken Merkem	2000	5950	J	17
Belgium	Handzamebroeken Esen	1994	5700	J	17
Belgium	Bourgoyen-Ossemeersen Drongen	1999	5295	J	17
Belgium	Uitkerkse Polder Uitkerke	1996	4910	J	17
Belgium	Zeebrugge Voorhaven	1994	4603	J	17
Denmark	Danish Wadden Sea	2002	12990	J	17
Denmark	Ulvedybet	1994	8200	J	17
Denmark	Rudbol So + Gammelkogene	2001	5066	J	17
Egypt	Lake Burullus	1990	19018	J	17
France	La Camargue	1995	15010	J	17
France	Golfe Du Morbihan	1992	6230	J	17
France	Baie De L'Aiguillon Et Pointe D'Arcay	2004	5770	J	17
Germany	Wattenmeer Sh 10	1993	31837	J	17
Germany	Wattenmeer Sh 08	1998	26967	J	17
Germany	Vorland Jadebusen	1995	20650	J	17
Germany	Neuharlingersiel – Carolinensiel	1996	20200	J	17
Germany	Wattenmeer Sh 06	1998	19158	J	17
Germany	Wattenmeer Sh 12	1995	15026	J	17
Germany	Wattenmeer Sh 09	1993	13296	J	17
Germany	Wattenmeer Sh 07	1998	13194	J	17
Germany	Wattenmeer Sh 11	2001	11555	J	17
Germany	Langeoog	1992	6870	J	17
Germany	Wattenmeer Sh 13	1994	6665	J	17
Germany	Emsvorland: Leer - Emden	1995	5618	J	17
Germany	Westbucht Fehmarnsund: Sundbrücke-Orth	1993	5232	J	17
Germany	Ostbucht Des Fehmarnsundes: Burger Binnensee	1990	4850	J	17
Germany	Wümmeniederung	1999	4675	J	17
Germany	Spiekeroog	2000	4548	J	17
Greece	Amvrakikos Wetlands	1995	35046	J	17
Greece	Evros Delta	1999	23550	J	17
Greece	Messolonghi Lagoon (From River Evinos To River Acheloos)	2000	16585	J	17
Greece	Axios, Loudias & Aliakmon Deltas	1999	7047	J	17
Greece	Alyki Kitrous	1990	4700	J	17
Greece	Kerkini	2001	4465	J	17
Greece	Porto Lagos (Lagos And Coast)	1999	4281	J	17
Greece	Ptelea Lagoon (Karakatsali) / Elos	1995	4250	J	17
Iran	Fereydoon Kenar, Ezbaran & Sorkh Rud Damgahs: Damgah Fereydoon Ke	1993	31200	J	17
Iran	Bakhtegan Lake	1997	28515	J	17
Iran	Gomishan Marsh	1991	16000	J	17

Table 2.20 continued: Eurasian Wigeon *Anas penelope*

Country	Sitename	Year	Count	Type	Ref.
Iran	Shadegan Marshes Protected Region: Total	2003	14256	J	17
Iran	Miankaleh W.R. & Gorgan Bay: Miankaleh Protected Region	1998	13000	J	17
Iran	Govater Bay & Hur-E-Bahu: Bahookalat River	1997	10455	J	17
Iran	Hamidieh Grassland	1994	9482	J	17
Iran	Helleh River: River And Delta	1991	8072	J	17
Iran	Dasht-E-Arjan Marsh	1995	7643	J	17
Ireland	Little Brosna Callows: Total	1996	14000	J	17
Ireland	Shannon And Fergus Estuary Ground: Total	1996	5904	J	17
Ireland	Shannon And Fergus Estuary Aerial: Total	1997	5799	J	17
Ireland	Rahasane Turlough	1996	5770	J	17
Ireland	Wexford Harbour And Slobs: Total	1995	5125	J	17
Ireland	Ballyeighter Lough	1994	4810	J	17
Ireland	Blackwater Callows: Total	1996	4217	J	17
Ireland	Tacumshin Lake: Total	1998	4000	J	17
Italy	Delta Del Po - Parte Veneta	2002	62963	J	17
Italy	Laguna Di Grado E Marano	1996	24649	J	17
Italy	Manfredonia	2003	19846	J	17
Italy	Laguna Di Venezia	2003	14427	J	17
Italy	Baia Di Panzano	2000	6950	J	17
Italy	Laghi Pontini	2002	5240	J	17
Italy	Maremma Grossetana	2001	5215	J	17
Italy	Trasimeno	2002	5046	J	17
Italy	Oristano	2003	4244	J	17
Kazakhstan	Kurgaldjinskyi Reserve	1995	14255	J	17
Morocco	Merja Zerga: Kenitra	1994	25980	J	17
Morocco	Barrage Al Massira: Settat	1994	7690	J	17
Netherlands	Markermeer	2002	86804	J	17
Netherlands	Friese Noordkust	1996	54639	J	17
Netherlands	Westerschelde	2001	51837	J	17
Netherlands	Reeuwijkse Plassen E.O.	2002	46895	J	17
Netherlands	Sneekermeer E.O.	1994	40400	J	17
Netherlands	Oosterschelde	2002	40261	J	17
Netherlands	Polder Zeevang	2001	37360	J	17
Netherlands	Haringvliet	1999	36444	J	17
Netherlands	Ijsselmeer	2001	35897	J	17
Netherlands	Lek	1997	31011	J	17
Netherlands	Krimpenerwaard	2002	29828	J	17
Netherlands	Oude Venen	1995	29769	J	17
Netherlands	Ijssel	2000	26971	J	17
Netherlands	Alkmaardermeer E.O.	1996	26943	J	17
Netherlands	Oostzaanse Polders En Het Ilperveld	2002	25946	J	17
Netherlands	Gelderse / Brabantse Maas	1997	24914	J	17
Netherlands	Waal	2002	23062	J	17
Netherlands	Grevelingen	1999	23004	J	17
Netherlands	Eemmeer. Nijkerkernauw En Nuldernauw	1998	22555	J	17
Netherlands	Texel	1992	22000	J	17
Netherlands	Midden-Delfland En Oude-Leede	2002	19503	J	17
Netherlands	Wormer- En Jisperveld	2000	18272	J	17
Netherlands	Eilandspolder	1990	18180	J	17

Table 2.20 continued: Eurasian Wigeon *Anas penelope*

Country	Sitename	Year	Count	Type	Ref.
Netherlands	Waterland	1990	17740	J	17
Netherlands	Terschelling	1992	17030	J	17
Netherlands	Veerse Meer	2002	15702	J	17
Netherlands	Fluessen En Heegermeer	1996	15690	J	17
Netherlands	Biesbosch	2001	14306	J	17
Netherlands	Dollard	1992	12800	J	17
Netherlands	Alblasserwaard	1997	12532	J	17
Netherlands	Oudegaaster Brekken	1995	12096	J	17
Netherlands	Koevordermeer	1999	12048	J	17
Netherlands	Grote Wielen	1992	12000	J	17
Netherlands	Zuidlaardermeer	2000	11763	J	17
Netherlands	Ameland	2001	11148	J	17
Netherlands	Volkerakmeer	2002	10711	J	17
Netherlands	Zwarte Meer	1995	10657	J	17
Netherlands	Nieuwe Waterweg / Calandkanaal	1997	10391	J	17
Netherlands	Nederrijn	1997	10220	J	17
Netherlands	Groningse Noordkust	1996	10188	J	17
Netherlands	Gooimeer	1990	10013	J	17
Netherlands	Nieuwkoopse Plassen	1994	9641	J	17
Netherlands	Gelderse Poort	2002	9244	J	17
Netherlands	Oostvaardersplassen	1998	8560	J	17
Netherlands	Schiermonnikoog	1998	8390	J	17
Netherlands	Balgzand En Wieringen	1996	8255	J	17
Netherlands	Leekstermeer	1993	7800	J	17
Netherlands	Zwarte- En Witte Brekken	1992	7200	J	17
Netherlands	Tjeukemeer	1992	6952	J	17
Netherlands	Vinkeveense Plassen En Botshol	2001	6230	J	17
Netherlands	Rottige Meenthe	1992	6010	J	17
Netherlands	Limburgse Maas	2002	5992	J	17
Netherlands	Markiezaat	1992	5673	J	17
Netherlands	Wolderwijd	2001	5140	J	17
Netherlands	De Deelen	1999	5067	J	17
Netherlands	Loosdrechtse Plassen E.O.	2000	5052	J	17
Netherlands	Lindevallei	1992	5000	J	17
Netherlands	Westzaanse Polders	2000	4789	J	17
Netherlands	Hollands Diep	1998	4732	J	17
Portugal	Ria De Faro	1994	11462	J	17
Portugal	Estuário Do Tejo	1999	9950	J	17
Russia	Neman River delta		25000	J	17
Russia	East Gulf of Finland and Ladoga Lake		500000	S	6
Russia	Faustov Floodplain		4500	S	28
Spain	Lucio Del Membrillo (H)	1992	35000	J	17
Spain	De La Algaida A Hato Villa (H)	1994	27020	J	17
Spain	Lucio De Los Ansares (Se)	2003	27012	J	17
Spain	Caño Del Guadiamar Pnd (H)	1997	26760	J	17
Spain	Parque Nacional De Doñana (Consolidation)	1991	21620	J	17
Spain	Marisma De Hinojos (H)	1992	19300	J	17
Spain	Los Pobres. Lucios De Beta La Plama (Consolidated)	1991	12700	J	17
Spain	Lucios De Beta La Palma-Isla Mayor (Se)	1991	12300	J	17

Table 2.20 continued: Eurasian Wigeon *Anas penelope*

Country	Sitename	Year	Count	Type	Ref.
Spain	Caño Travieso (Se)	1997	11762	J	17
Spain	Lucios De Veta Lengua Y Aguas Rubias (H)	1992	10500	J	17
Spain	Del Palacio A La Algaida (H)	2000	8555	J	17
Spain	Delta Del Ebro (T)	1994	7080	J	17
Spain	Lucio De Marilópez Grande (Se)	1995	6000	J	17
Spain	Lucios Del Caballero Y Del Puntal (H)	1992	6000	J	17
Spain	Saco Interior De La Bahía De Cádiz	1994	5900	J	17
Spain	De Aguas Rubias Al Lucio Del Hondón (H)	1997	4550	J	17
Spain	Preparque Este-P.Nat.Ent.Doñana	1993	4410	J	17
Spain	Marismas De Santoña (S)	1992	4270	J	17
Tunisia	Lac Ichkeul	1997	53380	J	17
Tunisia	Sebkha Kelbia	1995	30000	J	17
Tunisia	Garaet Mabtouha	1990	12750	J	17
Tunisia	Lagune De Ghar El Melah	1993	10800	J	17
Tunisia	Sebkha De Sejoumi	1995	5000	J	17
Tunisia	Lac De Bizerte	1994	4840	J	17
Turkey	Yumurtalik Lagoons(Yapi+Omerg)	1999	27190	J	17
Turkey	Akyatan Golu	1993	14320	J	17
Turkey	Goksu Delta (Silifke)	1992	11648	J	17
Turkey	Menderes Delta	1992	5623	J	17
Turkey	Kizilirmak (Karabogaz+Balik)	1995	5408	J	17
Turkey	Isikli Golu [Civril Golu]	1993	5010	J	17
Turkey	Tuzla Golu (Ceyhan Delta)	1996	4180	J	17
Turkmenistan	Krasnovodsk Gulf (Convention Mar)(Turkmenbasti)	2003	6320	J	17
United Kingdom	Ribble Estuary	1999	69149	J	17
United Kingdom	Swale Estuary	1997	40090	J	17
United Kingdom	Somerset Levels	2003	39492	J	17
United Kingdom	Ouse Washes	1992	37064	J	17
United Kingdom	Breydon Water & Berney Marshes	2001	26320	J	17
United Kingdom	North Norfolk Coast	2002	19078	J	17
United Kingdom	Lower Derwent Ings	1995	14000	J	17
United Kingdom	Nene Washes	1998	12699	J	17
United Kingdom	Mersey Estuary	1995	11970	J	17
United Kingdom	WWT Martin Mere	1993	11220	J	17
United Kingdom	Severn Estuary (English Counties)	1997	10875	J	17
United Kingdom	Thames Estuary	2003	9736	J	17
United Kingdom	Hamford Water And Naze Combined	1997	9511	J	17
United Kingdom	Loch Of Harray	2001	9476	J	17
United Kingdom	Walland Marsh	1997	8600	J	17
United Kingdom	Inner Moray And Inverness Firth	1999	8208	J	17
United Kingdom	Alde Complex	1997	8181	J	17
United Kingdom	Blackwater Estuary	2003	8142	J	17
United Kingdom	Middle Yare Marshes	1994	7460	J	17
United Kingdom	Morecambe Bay	1996	6995	J	17
United Kingdom	Abberton Reservoir	1992	6936	J	17
United Kingdom	Dornoch Firth Consolidated	2002	6768	J	17
United Kingdom	Arun Valley	2003	6237	J	17
United Kingdom	Cromarty Firth	1997	6102	J	17
United Kingdom	Loughs Neagh & Beg	1991	5949	J	17
United Kingdom	Humber Estuary	1997	5803	J	17

Table 2.20 continued: Eurasian Wigeon *Anas penelope*

Country	Sitename	Year	Count	Type	Ref.
United Kingdom	Medway Estuary	1992	5741	J	17
United Kingdom	Ashleworth Ham	2000	5662	J	17
United Kingdom	River Avon: Ringwood To Christchurch	2003	5165	J	17
United Kingdom	Rutland Water	1997	4968	J	17
United Kingdom	Dyfi Estuary	1997	4681	J	17
United Kingdom	Montrose Basin	1992	4635	J	17
United Kingdom	Fleet And Wey	2002	4611	J	17

2.12.2 Eurasian Wigeon movements

This species has a large breeding area covering northern latitudes in the Palearctic, from Iceland in the west to the Bering Strait in the east. With the exception of some small populations in western Europe, most populations are highly migratory with wintering areas from Europe in the west to southern Asia and Japan in the east. Only small numbers are found south of the Sahara desert during winter, mostly in the East African Rift Valley.

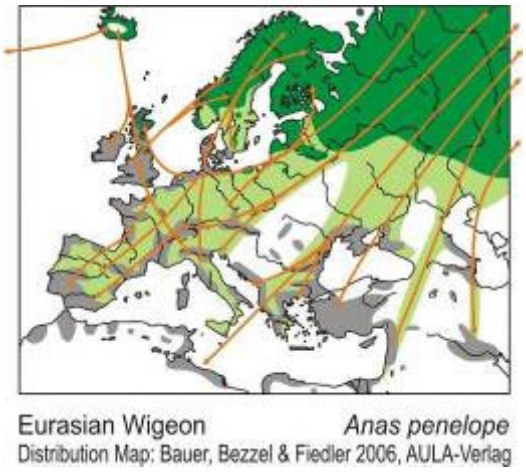


Figure 2.20: Map depicting the movements of Eurasian Wigeon *Anas penelope* based on published information and ring recoveries in the EURING Data Bank.

The majority of the recovered Eurasian Wigeon have been ringed in western Europe (Britain and The Netherlands), which is one out of the five main wintering areas for the Eurasian Wigeon. Large numbers are found in west Europe during the winter months (December-March), but recoveries are also reported in south Europe and eastwards to the Black Sea and the Caspian Sea. The most intense phases of return migration through southern Russia occur in April. During the breeding season (May – June) Eurasian Wigeon recoveries are reported from west Europe, Iceland, Scandinavia and Russia. Concentrations of recoveries during the breeding season are found east of the Urals along the river Ob and only a few recoveries are reported east of 90°E. Autumn migration continues until October and seems to follow a more northerly route than during spring migration. The return migration route seems to be more direct across central Europe. Recoveries in southern Russia and in Kazakhstan in autumn might be a result of moult migration of males and non-breeders. Birds breeding in Siberia are known to winter at the Caspian Sea and the Black Sea coasts, as well as in the Mediterranean area. Birds wintering in west Europe continue further south during severe winters.

Table 2.21: Summary of the movements of Eurasian Wigeon *Anas penelope* from the literature based on published information and ring recoveries in the EURING Data Bank.

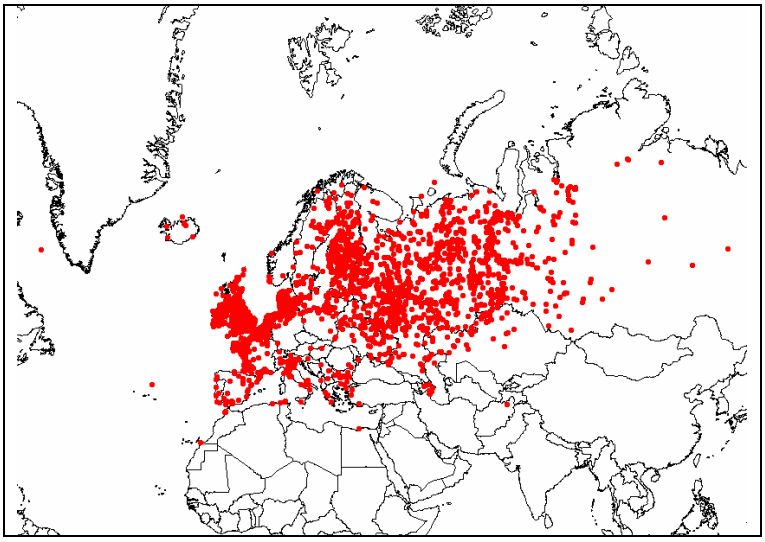
Eurasian Wigeon *Anas penelope*

Distribution: Europe and Asia, between 50°N and 70°N; small numbers West and East Africa and Arabian Peninsula. Five main wintering groups: NW-Europe (1,250,000), Black Sea and Mediterranean Basin (560,000), between. SW-Asia and NE Africa (250,000), South Asia (250,000), Eastern Asia (100,000-1,000,000)

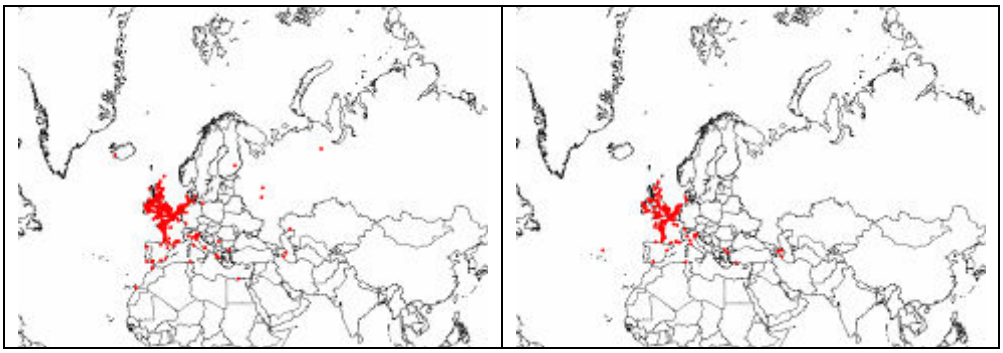
Moult migration: Males (late May-July) and non breeders moult in southern west Siberia, Russia, Volga Delta, Urals, upper Pechora, Estonia, S-Sweden, Denmark and Iceland; females (late June - early September)

Population (or part of population)	Autumn Migration		Wintering / Non-breeding Grounds		Spring Migration		References
	direction / via	during	location	during	direction / via	during	
Iceland	birds wintering in Ireland, France and Iberia probably via Britain	August	North America, Great Britain (mainly western areas), France, Scotland, Ireland, Italy	Oct-Nov		mid March-April	1, 3, 8, 12
Northwest Europe	in severe winters birds from NW-Europe probably mix with birds wintering in the Mediterranean Basin		dramatic increases during cold winters in Iberia, increases in East and West Britain and Ireland, north and west France		spring migration probably more southerly than that of autumn, more direct across Central Europe. Pair formation takes place in winter and males often follow females to her breeding grounds		3, 5,8, 10
British islands, Great Britain, Ireland	mainly sedentary with some dispersion	Sep	Netherlands, SW-France	Oct + Nov			1, 3, 5, 8
Germany, Netherlands, Belgium			Denmark, coasts of France, Belgium, Netherlands, Germany, Northern Italy; Great Britain	Nov-Feb		Mar-Apr	5, 7
N-Poland (rare)	W and SW		Denmark and Mid Europa				5
Fennoscandia and Russia	via Sweden, Denmark	Sep-Oct	N-, W- and SW-Europe, particularly western Germany, Poland, Netherlands, Great Britain/Ireland, France, Spain, Denmark, Latvia, Hungary, Ukraine, Italy, NW-Africa,				1, 4, 5, 6, 7, 8, 10, 12

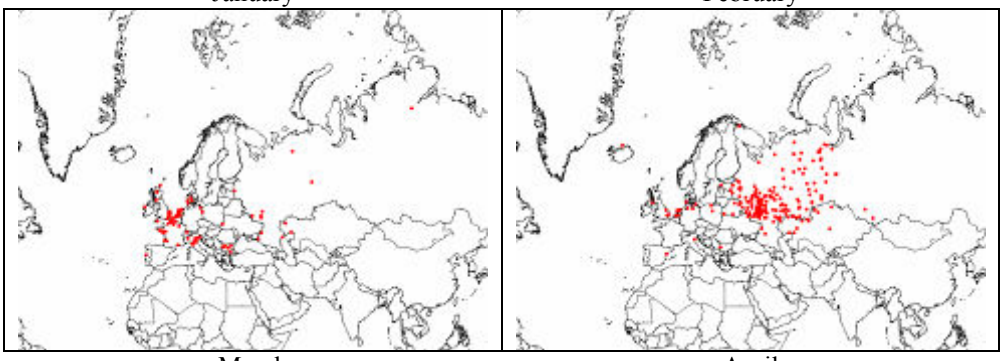
Kandalaksha Gulf (NE-Russia)	Southwest		Great Britain, Ireland, France, Begium, Germany, Denmark, S-Sweden, N-Italy, Norway				10
Norway		Sep-Oct	Important wintering sites in Great Britain, Ireland; Sweden, Netherlands, Belgium, France	Nov-Mar		Apr-May	3, 9
Sweden			Great Britain, Denmark, S-Sweden	Nov-Feb			4, 8, 10
Denmark, Sweden, Finland, Russia, Siberia			France, Spain, Belgium, Netherlands, Germany Great Britain, Sweden, Italy	Nov-Feb			1, 5, 7, 10, 12
West and Central Siberia	moulting in Volga Delta		Caspian Sea, Black Sea, Turkey, Greece, northern Italy, southern France, Mediterranean Basin westwards so southern Spain, North-Africa, some East Africa (up to Tanzania), Turkmenistan, Uzbekistan, India		northwest Europe		1, 4, 5, 6, 7, 9,10
Siberian Plain, Southern Siberia	via Lake Aral, Kasakhstan		Southwest Asia, Turkmenistan, South Caspian Sea, Uzbekistan				8, 9, 10
North-Eastern, Central Siberia	moult in N-Kazakhstan		Caspian, Black Sea				10
Eastern Siberia			Western Siberia				5
Unknown breeding ground			West Africa (Senegal, Niger, Chad)				1, 4, 5, 6, 7,
Moulting birds from Volga Delta			Western North Sea, Mediterranean, Black/Caspian Sea				7



Finding locations of all dead birds



January February



March April

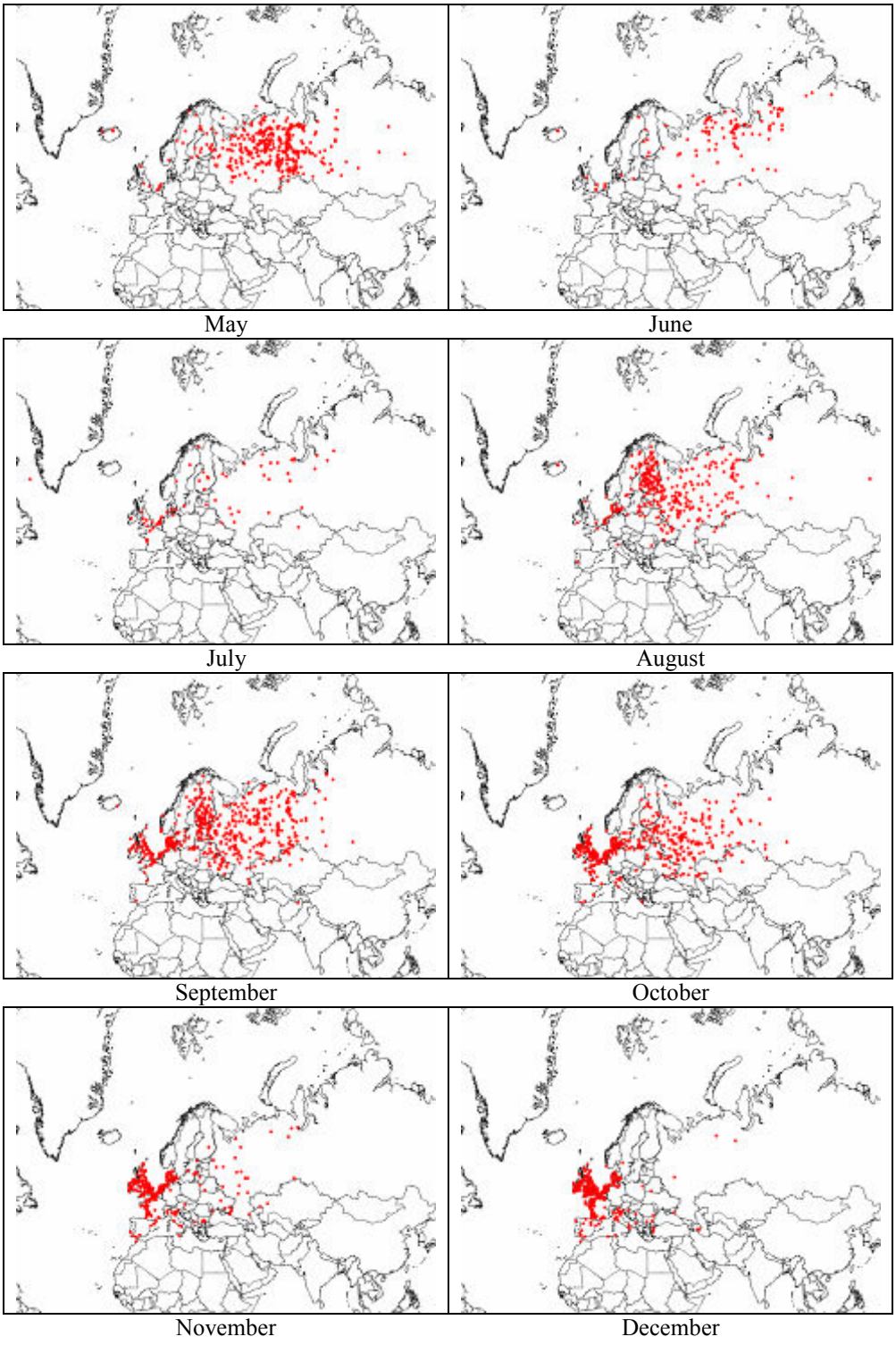


Figure 2.21: Finding locations of all dead Eurasian Wigeon *Anas penelope* in the EURING data bank. All birds are presented and also broken down by month.

2.13 Gadwall (*Anas strepera*)

2.13.1 Numbers and distribution

Figure 2.22 shows that the biggest Palearctic concentrations of Gadwall are in Iran and there are major moulting sites across the Caucasus in Russia. Other large concentrations are in southern France and northern Tunisia and Algeria. This is not a numerous species and other centres of population are in southern England, The Netherlands, lakes north of the Alps, Spain, Italy and Greece.

Of 40 sites where more than 3,000 Gadwall have been counted, 22 are in Iran and three in Azerbaijan (Table 2.22). The most important of these are Gyzylagach Nature Reserve (Azerbaijan) where 21,100 were counted, and Fereydon Kenar, Iran, where there were 21,000 in 2003. There are few key sites in the Black Sea- East Mediterranean region, the most important being Amvrakikos Wetlands, Greece, where 3,600 were counted in 1998. The West Mediterranean is more important. The highest January count of all was made at Lake Oubeira, Algeria, in 1994, when 23,920 were counted, and Lac Fetzara recorded 13,800 in 1998. The Camargue, France, recorded 13,570 in 1994, and in Spain, 4,686 and 4,630 were counted in the Ebro Delta and Doñana National Park in, respectively, 1999 and 1994. The Grado Lagoon, Italy recorded 3,188 in 1992. Further north in Europe counts are mostly lower, with 5,769 at the Bodensee (Germany-Switzerland-Austria) in 1996, and 3,042 on the river Rhine in Germany between Breisach and Nonnenweier in 1990. The highest count recorded in The Netherlands was 2,220 at Grevelingen in 2002.

Table 2.22: Gadwall *Anas strepera*: Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 600 or more have been recorded.

Country	Sitename	Year	Count	Type	Ref.
Albania	Karavasta Complex	1997	830	J	17
Algeria	Lac Oubeira	1994	23920	J	17
Algeria	Lac Fetzara	1998	13800	J	17
Algeria	Lac Tonga	1998	3220	J	17
Algeria	Marais De La Macta	1996	690	J	17
Azerbaijan	Caspian Coast: Gyzylagach Nature Reserve		21100	J	17
Azerbaijan	Kirov Bay	1991	3460	J	17
Azerbaijan	Hagygabul Gyolu (Hadgegabol Lake)	1996	3160	J	17
Azerbaijan	Sarysu Lake (Sarasuy)		2332	J	17
Azerbaijan	Big Kyzyl-Agach Bay	1996	1299	J	17
Azerbaijan	Mahmud-Chala Lake (Third Chala)	1996	850	J	17
Azerbaijan	Lake Aggyol		637	J	17
Azerbaijan	Mahmudchala Lake		633	J	17
Belgium	Schulensbroek Schulen	2002	625	J	17
Egypt	Nile Valley Cairo-Aswan(850Km)	1990	838	J	17
France	La Camargue	1994	13570	J	17
France	Cours Du Rhin (67 / 68)	1999	5153	J	17
France	Lac De Grandlieu	2002	1550	J	17
France	Etangs D'Orx	2004	929	J	17
France	Etangs De La Brenne	1996	818	J	17
France	Grand Plan Du Bourg; Dont Complexe Du Vigueirat	2001	669	J	17
Germany	Rhein: Nonnenweier-Kehl	2002	3042	J	17

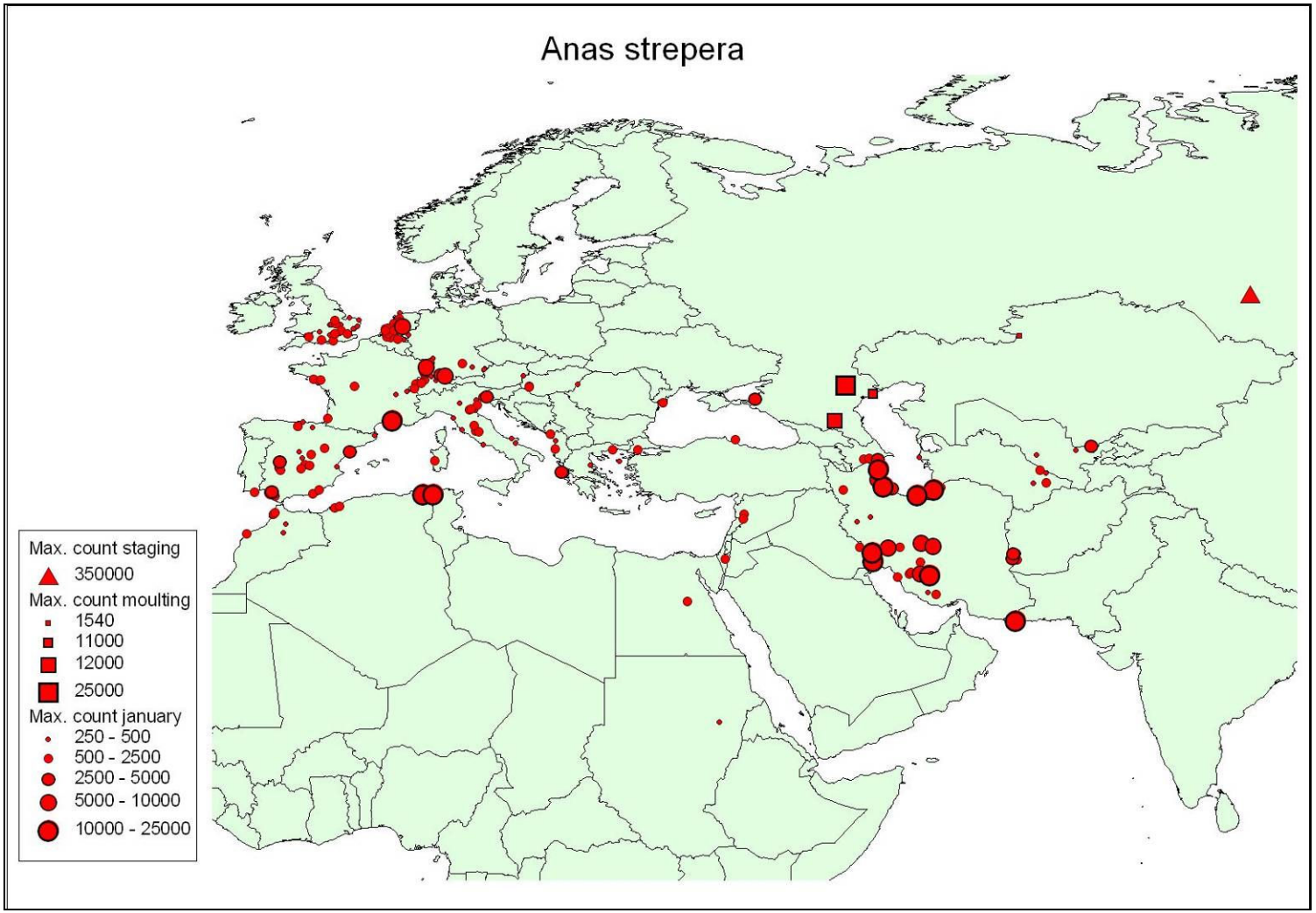


Figure 2.22: Gadwall *Anas strepera*: Peak counts between 1990 and 2005 at the sites in Europe, Africa, West and Central Asia where 250 or more have been recorded.

Table 2.22 continued: Gadwall *Anas strepera*

Country	Sitename	Year	Count	Type	Ref.
Germany	Rhein: Breisach - Nonnenweier	1990	2712	J	17
Germany	Rhein: Weil-Breisach	2003	790	J	17
Germany	Rhein: Kehl-Helmlingen	1997	760	J	17
Germany / Switzerland / Austria	Bodensee Gesamt	1996	5769	J	17
Greece	Amvrakikos Wetlands	1998	3600	J	17
Greece	Evros Delta	1998	1832	J	17
Greece	Keramoti Lagoons	1997	800	J	17
Hungary	Kisbalaton Tarozo	2001	910	J	17
Iran	Fereydoon Kenar, Ezbaran & Sorkh Rud Damgahs: Damgah Fereydoon Ke	2003	21000	J	17
Iran	Bakhtegan Lake	1997	17750	J	17
Iran	Govater Bay & Hur-E-Bahu: Bahookalat River	1997	15927	J	17
Iran	Anzali Mordab Complex: Sorkhankel	2003	15800	J	17
Iran	Gomishan Marsh	1991	13000	J	17
Iran	Hamidieh Grassland	1994	12418	J	17
Iran	Shadegan Marshes Protected Region: Total	2003	11896	J	17
Iran	Maharloo Lake	1997	9900	J	17
Iran	Anzali Mordab Complex: Selkeh Protected Region	1992	8013	J	17
Iran	Miangaran Marshes: Miangaran & Izeh Marshes	1994	7765	J	17
Iran	Paein Rud Posht Ab-Bandan	2003	7400	J	17
Iran	Anzali Mordab Complex: Anzali Mars West (Main Lagoon)	2003	7300	J	17
Iran	Gavekhoni Marsh	1990	6607	J	17
Iran	Caspian Coast (Gilan): Astara - Hashtpar	2003	6300	J	17
Iran	Anzali Mordab Complex: Siakeshim Protected Region	2003	4864	J	17
Iran	Chookam Ab-Bandan	2003	4600	J	17
Iran	Anzali Mordab Complex: Anzali Marsh East	2003	4500	J	17
Iran	Miankaleh W.R. & Gorgan Bay: Miankaleh Protected Region	2003	4000	J	17
Iran	Lavandavil Wildlife Refuge: Lavandavil Marsh	2003	3755	J	17
Iran	Amirlayeh & Sheikh Ali Kol: Amirlayeh Lake	2003	3700	J	17
Iran	Hamoun Lakes Complex: Hamoun-E-Saberi	1994	3132	J	17
Iran	Hamoun Lakes Complex: Kuh-I-Khajeh	1997	2900	J	17
Iran	Anzali Mordab Complex: Part Of Siahkeshim Protected Region	2003	2800	J	17
Iran	Sayed Mahali & Zarinkola Ab: Zarinkola Ab-Bandan	1990	2410	J	17
Iran	Helleh River: River And Delta	1997	2370	J	17
Iran	Horeh Bamdej Marshes: Horeh Bamdej Marsh	2003	2207	J	17
Iran	Dasht-E-Arjan Marsh	1990	2200	J	17
Iran	Sorkhrood Damgah	1997	2200	J	17
Iran	Ala Gol Marshes: Ala Gol	1995	2100	J	17
Iran	Ala Gol Marshes: Ulma Gol	1995	2100	J	17
Iran	Said Mahaleh (Sayed Mohalli) Ab-Bandan	1993	2078	J	17
Iran	Anzali Mordab Complex: South Of Anzali Wetland	1998	2075	J	17
Iran	Dasht-E-Azadegan: Susangerd-Howeizeh-Bostan Plain	1993	1800	J	17
Iran	Fereydoon Kenar, Ezbaran & Sorkh Rud Damgahs: Esbaran Marsh	1997	1800	J	17
Iran	Dasht-E-Azadegan: Horeh Sosangerd	1990	1755	J	17
Iran	Fereydoon Kenar, Ezbaran & Sorkh Rud Damgahs: Damgah Sorkherud	2003	1550	J	17
Iran	Kaftar Lake	2003	1550	J	17
Iran	Anar Marz Ab-Bandan	1990	1520	J	17

Table 2.22 continued: Gadwall *Anas strepera*

Country	Sitename	Year	Count	Type	Ref.
Iran	Hamoun Lakes Complex: Chong Sourkh	1998	1506	J	17
Iran	Abbas-Abad Dam	2003	1500	J	17
Iran	Ezbaran Damgah	2003	1500	J	17
Iran	Miankaleh W.R. & Gorgan Bay: Lapoo - Zaghmarz Ab-Bandan	2003	1400	J	17
Iran	Hoor Al-Azim Marshes	1997	1313	J	17
Iran	Pain Rudposht Ab-Bandan	1998	1308	J	17
Iran	Chah Nimeh Lake	1997	1260	J	17
Iran	Parishan Lake	1995	912	J	17
Iran	Larim Ab-Bandan	1993	850	J	17
Iran	Choghakhor Marsh	1995	828	J	17
Iran	Dasht-E-Azadegan: Hoveizeh And Surroundings	2003	765	J	17
Iran	Miankaleh W.R. & Gorgan Bay: Gorgan Bay	1997	700	J	17
Iran	Shahr Pir & Ezadkhast (Near Lar)	1995	700	J	17
Iran	Chaf Bala Ab-Bandan	1994	655	J	17
Italy	Laguna Di Grado E Marano	1992	3188	J	17
Italy	Trasimeno	1995	1790	J	17
Italy	Valli Di Argenta	1994	1022	J	17
Italy	Laguna Di Caorle E Valli Di Bibione	2002	1013	J	17
Italy	Lago Di Narni	2003	816	J	17
Italy	Lago Di Alviano	2001	692	J	17
Italy	Oristano	1995	669	J	17
Italy	Pianura Bolognese - Settore Est	1999	629	J	17
Kazakhstan	Chardara Vdchr	2004	3435	J	17
Kazakhstan	Kulykol-Taldykol Lake System	2000	1540	M	5
Morocco	Marais Du Bas Loukkos	1994	870	J	17
Morocco	Merja Bargha	1991	690	J	17
Morocco	Dayet Al Hafs (Jorf Lasfar)	1991	600	J	17
Netherlands	Grevelingen	2002	2220	J	17
Netherlands	Biesbosch	2001	2095	J	17
Netherlands	Amsterdam-Rijnkanaal	1996	1062	J	17
Netherlands	Noordzeekanaal	2002	1003	J	17
Netherlands	Nieuwe Waterweg / Calandkanaal	2002	941	J	17
Netherlands	Markermeer	1998	928	J	17
Netherlands	Ijsselmeer	1992	693	J	17
Netherlands	Markiezaat	1990	607	J	17
Portugal	Ria De Faro	1999	1040	J	17
Romania	Delta Dunarii (Danube Delta)	1994	1345	J	17
Russia	Group of limans between the Kuban and Protoka		2750	J	17
Russia	Volga-Akhtuba Floodplain		25000	M	22
Russia	Pre-Caucasus Total		12000	M	22
Russia	North Caspian Sea Total		11000	M	22
Russia	West Siberia		350000	S	22
Spain	Delta Del Ebro (T)	1999	4686	J	17
Spain	Parque Nacional De Doñana (Consolidation)	1994	4630	J	17
Spain	Lucio De Los Ansares (Se)	2003	3696	J	17
Spain	Marisma De Hinojos (H)	2001	3260	J	17
Spain	Embalse De Valdecañas	2003	2628	J	17
Spain	Lucio Del Membrillo (H)	1994	2410	J	17
Spain	Lucios De Veta Lengua Y Aguas Rubias (H)	1992	2000	J	17

Table 2.22 continued: Gadwall *Anas strepera*

Country	Sitename	Year	Count	Type	Ref.
Spain	Tablas De Daimiel (Cr)	1998	1450	J	17
Spain	Lucios De Beta La Palma-Isla Mayor (Se)	1999	1388	J	17
Spain	Embalse De Orellana	1991	1333	J	17
Spain	Caño Travieso (Se)	1997	1230	J	17
Spain	Embalse De Sierra Brava	2003	1165	J	17
Spain	Embalse De Buendía (Cu)	2003	1156	J	17
Spain	Laguna De Manjavacas (Cu)	1999	974	J	17
Spain	Laguna De Gallocanta (Z)	1990	804	J	17
Spain	Lucios Al Sur De De Los Ansares (Se)	1990	800	J	17
Spain	De Aguas Rubias Al Lucio Del Hondón (H)	1997	710	J	17
Spain	Laguna Chica - Villafranca De Los Caballeros (To)	1998	648	J	17
Spain	Embalse De Zújar - Serena	1995	606	J	17
Switzerland	Lac Léman-Ch	2003	1166	J	17
Switzerland	Aare: Wohlensee	2004	926	J	17
Switzerland	Lac De Neuchâtel	1998	731	J	17
Syria	Qattine	1993	700	J	17
Syria	Al-Rastan Dam	1995	600	J	17
Turkmenistan	Floodplain Chardzhev-Soskara	1995	1000	J	17
Turkmenistan	Lower Atrek River: Total	1999	813	J	17
Turkmenistan	Caspian Coast: Gasankuli-Guyjuk	1991	800	J	17
Turkmenistan	Kelif Floodlands (Formerly Kelif Lakes)	1993	600	J	17
United Kingdom	Somerset Levels	2003	1077	J	17
United Kingdom	Wraysbury Gravel Pits	1999	923	J	17
United Kingdom	Thames Estuary	2003	815	J	17
United Kingdom	River Avon: Fordingbridge To Ringwood	2001	794	J	17
United Kingdom	Lee Valley Gravel Pits	2000	764	J	17
United Kingdom	Rutland Water	1996	601	J	17
Serbia&Montenegro -Albania	Skadarsko Jezero	1999	700	J	17

2.13.2 Gadwall movements

The Gadwall is a Holarctic species with breeding areas in northwestern North America, locally in Europe and eastwards to northern China. The species is largely migratory, but resident in western and southern Europe.

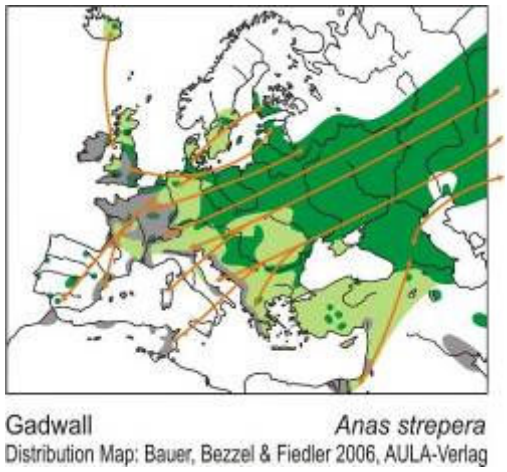


Figure 2.23: Map depicting the movements of Gadwall *Anas strepera* based on published information and ring recoveries in the EURING Data Bank

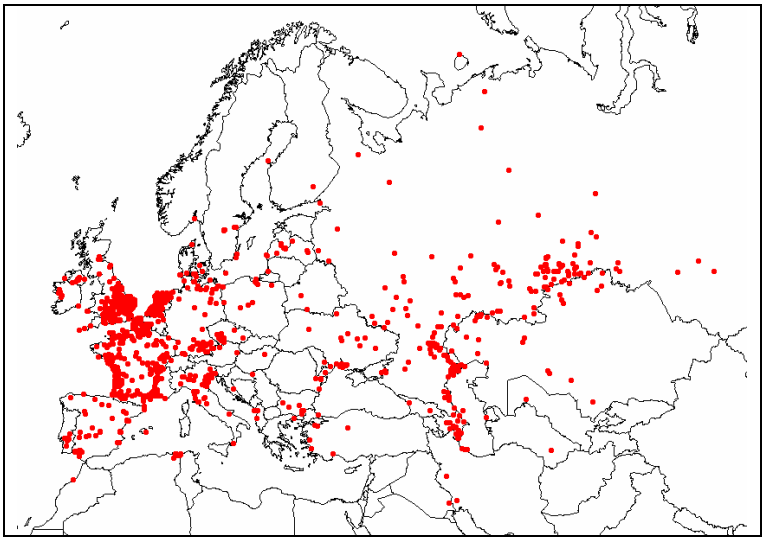
Ringed in small numbers in most countries, the largest numbers of recoveries are from birds ringed in Britain, Russia, The Netherlands and Germany. Recoveries between December and February are concentrated in western Europe, but some are also reported from the Mediterranean and the Caspian Sea areas. Few recoveries are reported during March, while recoveries are spread out in southern Russia and Kazakhstan in April. During the breeding season, recoveries are found in western and central Europe and in southern Russia east to southwestern Siberia. The number of recoveries increases in western Europe in September and in November most birds in Russia have moved to coastal areas of the Caspian Sea. Birds breeding in Britain, Denmark, Scandinavia, the Baltic, Poland and European Russia migrate to western Europe and the Mediterranean. Central European birds and birds breeding in eastern Europe and southwestern Siberia winter in the area of the Black and the Caspian Seas, eastern Mediterranean, Turkey and south to the Nile and a few as far as East Africa. Birds breeding in Siberia also winter in the Caspian Sea, in Turkmenistan, Uzbekistan, Pakistan and India. Important moulting areas for males are known from the northern Caspian Sea area, e.g. the Volga delta, but also in lakes in Kazakhstan.

Table 2.23: Summary of the movements of Gadwall *Anas strepera* from the literature based on published information and ring recoveries in the EURING Data Bank.

Gadwall *Anas strepera*

Distribution: Holarctic, across North America and Eurasia. Three main wintering groups, but no evidence of different populations: NW-Europe, Central Europe/Black Sea/Mediterranean, SW-Asia. pair formation takes place in winter and males often follow females to her breeding grounds

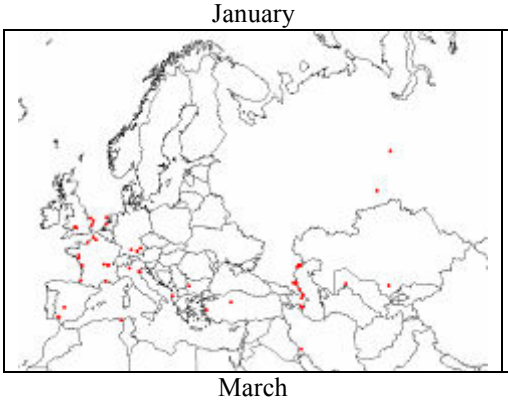
Population (or part of population)	Autumn Migration		Wintering / Non-breeding Grounds		Spring Migration		References
	direction / via	during	location	during	direction / via	during	
Iceland			Britain and Ireland				8
Scandinavia, Great Britain, Denmark (rare), Baltic states, Germany, Poland, European Russia	Denmark, Netherlands		Western Europe, mix with sedentary population in Netherlands, France, Italy, Britain and Ireland, Denmark, as far as Mediterranean				1, 2, 3, 5, 6, 7, 8, 12
Eastern Europe to Western Siberia	WSW to SW, many via Italy	Sep-Nov	Black Sea, Caspian Sea regions, Greece, Turkey, Nile Delta, few as far as East-Africa:Nile Valley south to Sudan, Ethiopian highlands, rarely Somalia, Tanzania, Kenya. Few West Africa, Senegal Delta, Nigeria, Chad		Mar-Apr		1, 3, 8, 11, 12
SW-Siberia	WSW		along shore of Caspian Sea, Turkmenistan, Uzbekistan, India, Pakistan				11
Western Eurasia			South to North Africa and the Gulf, few further south into Sub-Saharan Africa, Arabian Peninsula				8



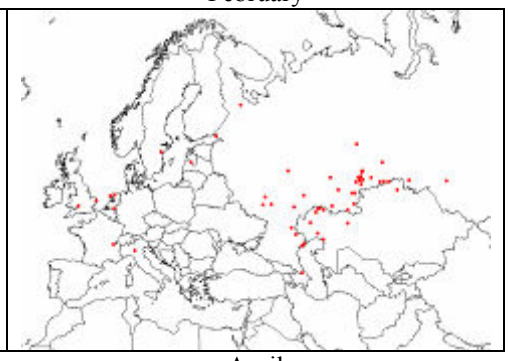
Finding locations of all dead birds

January

February



March



April

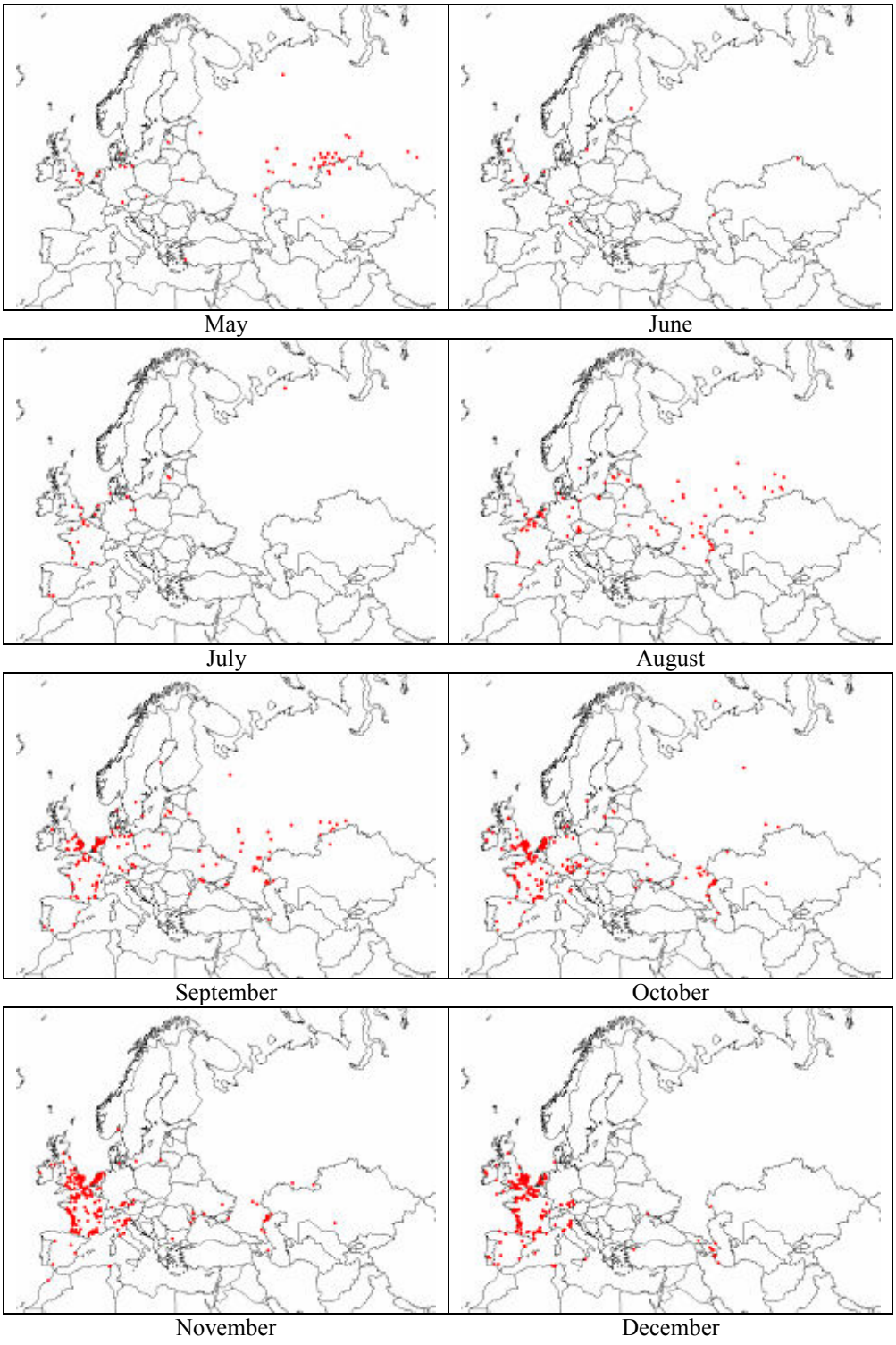


Figure 2.24: Finding locations of all dead Gadwall *Anas strepera* in the EURING data bank. All birds are presented and also broken down by month.

2.14 Common Teal (*Anas crecca*)

2.14.1 Numbers and distribution

Common Teal is numerous and widespread in winter and in Europe is only absent from upland areas and those affected by prolonged freezing (Figure 2.25). Highest totals are recorded in Iran and Azerbaijan. In Europe, more Common Teal are counted in Greece than in any other country, and other key sites are in Albania, Italy, France, Spain and Portugal. Important numbers also occur in the UK and Ireland, and in a belt stretching east through The Netherlands and Germany. Estimates have been made for breeding areas in Northern Russia and key staging sites have been identified on the north Caspian coasts of Russia and Kazakhstan.

The highest January counts are in Iran and Azerbaijan, and Common Teal has a more dispersed distribution in Europe (Table 2.24). The highest recorded count is of 210,300 at Bakhtegan and Tashk lakes, Iran in 1995, and there were 93,000 at Fereydoon Kenar in 2003. In Azerbaijan, similar numbers have been recorded at Kirov Bay and Gyzylagach Nature Reserve, where 66,200 and 62,245 were counted in 1991 and 1996, respectively. The highest counts in Europe come from Greece, where 100,750 were counted at the Evros Delta, and 38,400 at Amvrakikos Wetlands in 1999, and 31,500 at Kerkini in 1995. 40,000 were counted at Skadarsko Jezero, on the border of Montenegro and Albania, in 1993. In the West Mediterranean Region, Spain is important, with 84,100 at The Doñana National Park in 1991 and 42,100 at De La Algaida A Hato Villa in 1991. The Camargue (France) Venice Lagoon (Italy) and Tejo Estuary (Portugal) are additional sites where more than 25,000 have been counted in this region. In France, the Low Countries, The UK and Ireland there are high densities of sites where lower counts were recorded, and the highest count in these countries was made at the Somerset Levels (UK) where 33,350 were counted in 2003.

Table 2.24: Common Teal *Anas crecca*: Peak counts between 1990 and 2005 at sites in Europe, Africa West and Central Asia where 4,000 or more have been recorded.

Country	Sitename	Year	Count	Type	Ref.
Albania	Karavasta Complex	2000	16766	J	17
Albania	Narta Complex	2001	8340	J	17
Algeria	Les Lacs = Chott De Tinnsilt	1991	5500	J	17
Algeria	Marais De Mekhada	1998	5007	J	17
Azerbaijan	Kirov Bay	1991	66200	J	17
Azerbaijan	Big Kyzyl-Agach Bay	1996	62245	J	17
Azerbaijan	Caspian Coast: Gyzylagach Nature Reserve		41500	J	17
Azerbaijan	Sarysu Lake (Sarasuy)		23320	J	17
Azerbaijan	Mahmudchala Lake		12900	J	17
Azerbaijan	Aggel (Ah Gol) Lake	1991	11000	J	17
Azerbaijan	Hagygabul Gyolu (Hadgegabol Lake)		6500	J	17
Azerbaijan	Shah Cape (Apsheron Peninsula)	1993	4500	J	17
Belgium	Schelde Branst - Veer Hamme	2002	6298	J	17
Bulgaria	Piasachnik Reservoir	1997	4013	J	17
Egypt	Lake Manzala	1990	4435	J	17
France	La Camargue	1991	27000	J	17
France	Grand Plan Du Bourg; Dont Complexe Du Vigueirat	2001	13169	J	17
France	Loire Aval	1996	13049	J	17

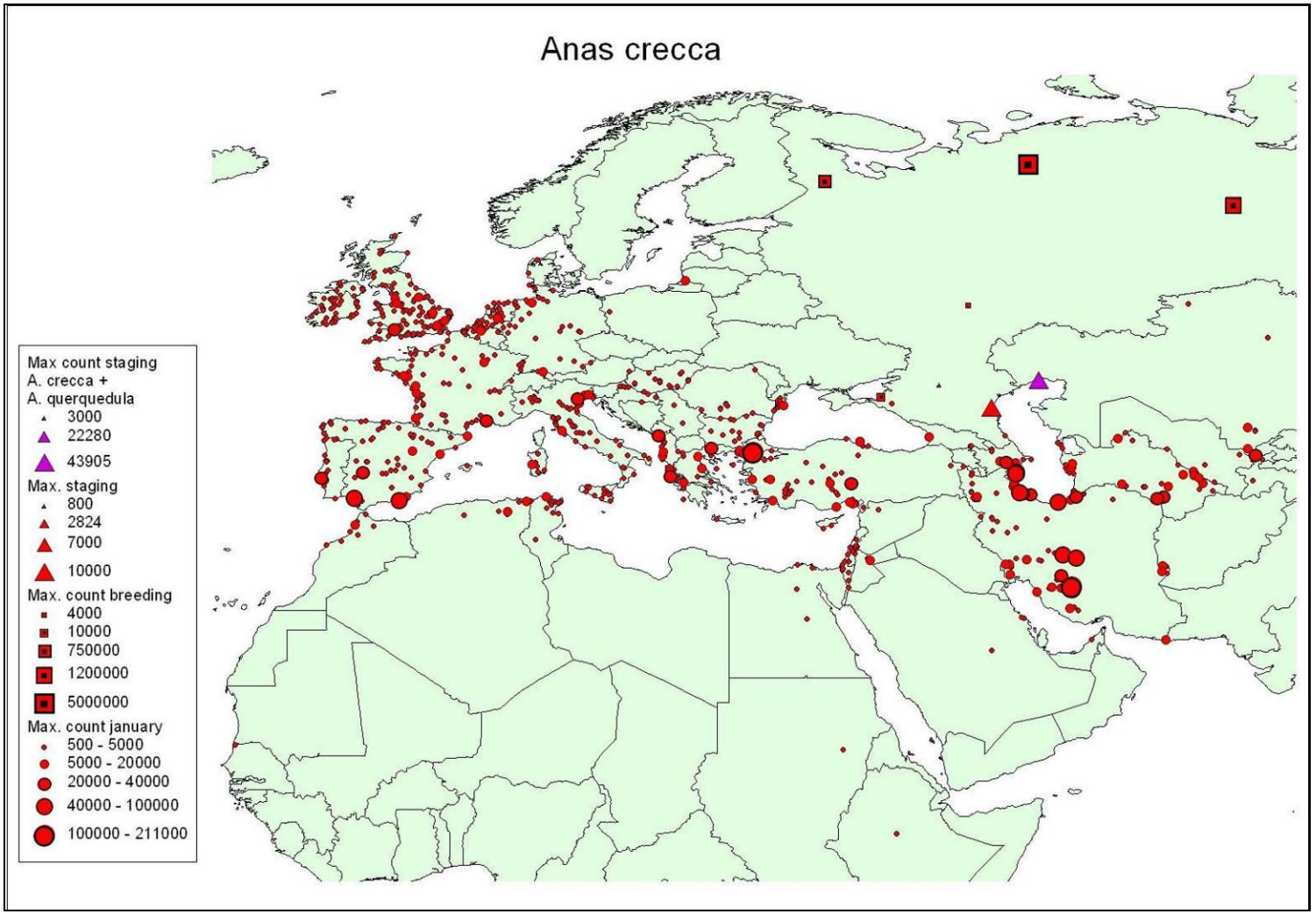


Figure 2.25: Common Teal *Anas crecca*: Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 500 or more have been recorded.

Table 2.24 continued: Common Teal *Anas crecca*

Country	Sitename	Year	Count	Type	Ref.
France	Résèrve Naturelle De St. Denis Du Payre	2000	10800	J	17
France	Résèrve Naturelle De Moeze (Charente-Seudre)	2001	10646	J	17
France	Lacs: Orient. Amance Et Temple-Auzon	2003	9733	J	17
France	Etangs D'Orx	1993	6660	J	17
France	Lac De Grandlieu	2004	6070	J	17
France	Baie De L'Aiguillon Et Pointe D'Arcay	1994	4820	J	17
France	Loire Amont	2002	4610	J	17
France	Lac Du Der-Chantecoq (51 / 52)	2001	4554	J	17
France	Etang De Carcans-Hourtin	1995	4400	J	17
Georgia	Paliastomi Lake	1998	8600	J	17
Germany	Weser: Strohauser Plate	1991	11473	J	17
Germany / Switzerland / Austria	Bodensee Gesamt	1999	7190	J	17
Greece	Evros Delta	1999	100750	J	17
Greece	Amvrakikos Wetlands	1999	38400	J	17
Greece	Kerkini	1995	31500	J	17
Greece	Axios, Loudias & Aliakmon Deltas	1999	11140	J	17
Greece	Vistonis (Bourou)	1996	10900	J	17
Greece	Messolonghi Lagoon (From River Evinos To River Acheloos)	1993	8447	J	17
Greece	Porto Lagos (Lagos And Coast)	1995	6520	J	17
Greece	Acheron Delta (Secondary)	1992	6400	J	17
Greece	Karla Reservoirs (Former L.Karla)	1999	6020	J	17
Greece	Kalamas Delta	1999	6012	J	17
Greece	Ismaris (Mitrikou)	2001	5489	J	17
Hungary	Lake Fertö; (Hungarian Part)	2000	4000	J	17
Iran	Bakhtegan & Tashk Lakes	1995	210300	J	17
Iran	Fereydoon Kenar, Ezbaran & Sorkh Rud Damgahs: Damgah Fereydoon Ke	2003	93000	J	17
Iran	Paein Rud Posht Ab-Bandan	2003	50000	J	17
Iran	Anzali Mordab Complex: Anzali Mars West (Main Lagoon)	2003	42000	J	17
Iran	Gavekhoni Marsh	1990	41519	J	17
Iran	Anzali Mordab Complex: Siakeshim Protected Region	2003	37000	J	17
Iran	Anzali Mordab Complex: Anzali Marsh East	2003	32500	J	17
Iran	Anzali Mordab Complex: Part Of Siahkeshim Protected Region	2003	32000	J	17
Iran	Gomishan Marsh	1991	30000	J	17
Iran	Kaftar Lake	1997	30000	J	17
Iran	Chookam Ab-Bandan	2003	28000	J	17
Iran	Anzali Mordab Complex: Selkeh Protected Region	2003	26500	J	17
Iran	Amirlayeh & Sheikh Ali Kol: Amirlayeh Lake	2003	25000	J	17
Iran	Anzali Mordab Complex: Sorkhankel	2003	24000	J	17
Iran	Lavandavil Wildlife Refuge: Lavandavil Marsh	2003	18500	J	17
Iran	Shadegan Marshes Protected Region: Total	2003	18240	J	17
Iran	Pain Rudposht Ab-Bandan	1998	16907	J	17
Iran	Caspian Coast (Gilan): Anzali – Langarud	2003	16200	J	17
Iran	Dasht-E-Arjan Marsh	2003	15675	J	17
Iran	Caspian Coast (Gilan): Astara – Hashtpar	2003	14500	J	17
Iran	Miankaleh W.R. & Gorgan Bay: Miankaleh Protected Region	1990	14197	J	17
Iran	Caspian Coast (Gilan): Hashtpar – Anzali	2003	13950	J	17

Table 2.24 continued: Common Teal *Anas crecca*

Country	Sitename	Year	Count	Type	Ref.
Iran	Miangaran Marshes: Miangaran & Izeh Marshes	1992	13150	J	17
Iran	Govater Bay & Hur-E-Bahu: Bahookalat River	1997	12880	J	17
Iran	Dasht-E-Azadegan: Hoveizeh And Surroundings	2003	12666	J	17
Iran	Rasht Fishpond	2003	12130	J	17
Iran	Hamidieh Grassland	1992	9742	J	17
Iran	Anar Marz Ab-Bandan	1990	9600	J	17
Iran	Hamoun Lakes Complex: Kuh-I-Khajeh	1993	9201	J	17
Iran	Helleh River: River And Delta	1992	8956	J	17
Iran	Maharloo Lake	1997	7532	J	17
Iran	Urmiyeh (Uromiyeh) Lake: Ghareh-Gheshlagh Marsh	1994	7393	J	17
Iran	Hamoun Lakes Complex: Hamoun-E-Saberi	1994	6757	J	17
Iran	Bujagh National Park: Sefid Rud Mouth	1991	6450	J	17
Iran	Harm Lake Complex: Harmkarion Lake (Near Khunj)	1994	5800	J	17
Iran	Fereydoon Kenar, Ezbaran & Sorkh Rud Damgahs: Damgah Sorkherud	2003	5200	J	17
Iran	Caspian Coast (Gilan): Anzali- Astara	1998	5106	J	17
Iran	Aras River: Bralan - Aras Dam	1997	5000	J	17
Iran	Bujagh National Park: Bandar Kiashahr Lagoon	2003	5000	J	17
Iran	Parishan Lake	1990	5000	J	17
Iran	Ezbaran Damgah	2003	4500	J	17
Iran	Urmiyeh (Uromiyeh) Lake:: Total	1990	4224	J	17
Iran	Urmiyeh (Uromiyeh) Lake: Southern Coast	1992	4000	J	17
Ireland	Little Brosna Callows: Total	1996	4000	J	17
Israel	Hula Valley	1993	4113	J	17
Italy	Laguna Di Venezia	2002	30308	J	17
Italy	Maremma Grossetana	1994	9484	J	17
Italy	Laguna Di Grado E Marano	1991	8330	J	17
Italy	Laguna Di Caorle E Valli Di Bibione	2003	6952	J	17
Italy	Oristano	2002	6838	J	17
Italy	Delta Del Po - Parte Veneta	2002	6033	J	17
Jordan	Azraq Oasis	1992	6000	J	17
Kazakhstan	Chardara Vdchr	1992	15000	J	17
Kazakhstan	Chuchkakol Lakes	2004	9300	J	17
Morocco	Merja Zerga: Kenitra	1990	6616	J	17
Portugal	Estuário Do Tejo	1999	25500	J	17
Portugal	Estuário Do Sado	1993	10389	J	17
Romania	Island Sahalin-Melea (= Sahalin I.- Mainland)	1991	8000	J	17
Romania	Budeasa	1990	4500	J	17
Romania	Delta Dunarii (Danube Delta)	1994	4242	J	17
Romania	Golesti	1998	4000	J	17
Russia	Middle & south taiga of West Siberia		5000000	B	22
Russia	Lower & Upper Dvuobje		1200000	B	22
Russia	Northwestern of European Russia		750000	B	22
Russia	Kuban Delta		10000	B	12
Russia	Penza Region		4000	B	9
Russia	Neman River delta		15000	J	17
Russia	Kyzlyar Bay		10000	S	7
Spain	Parque Nacional De Doñana (Consolidation)	1991	84100	J	17
Spain	De La Algaida A Hato Villa (H)	1991	42100	J	17
Spain	Embalse De Sierra Brava	2003	30940	J	17

Table 2.24 continued: Common Teal *Anas crecca*

Country	Sitename	Year	Count	Type	Ref.
Spain	Marisma De Hinojos (H)	1992	23000	J	17
Spain	Lucios Del Caballero Y Del Puntal (H)	1992	22000	J	17
Spain	Lucios De Beta La Palma-Isla Mayor (Se)	1999	18654	J	17
Spain	Delta Del Ebro (T)	1999	15310	J	17
Spain	Lucios De Veta Lengua Y Aguas Rubias (H)	1992	13200	J	17
Spain	Lucio De Marilópez Grande (Se)	1991	13000	J	17
Spain	Del Palacio A La Algaida (H)	2001	11980	J	17
Spain	Laguna De Gallocanta (Z)	1990	8633	J	17
Spain	Del Puntal Al Palacio De Doñana (H)	2000	8600	J	17
Spain	Lucio De Los Ansares (Se)	1992	7500	J	17
Spain	Caño Del Guadiamar Pnd (H)	1992	6000	J	17
Spain	Aiguamolls De L'emporda (Gi)	1994	5396	J	17
Spain	Embalse Del Cubilar	2003	5200	J	17
Spain	Lucio Del Membrillo (H)	1992	5050	J	17
Spain	Embalse De Zújar – Serena	1993	5036	J	17
Spain	Lucios Al Sur De De Los Ansares (Se)	1992	5000	J	17
Spain	Laguna De Sariñena (Hu)	1991	4933	J	17
Spain	Embalse De Alange	1992	4501	J	17
Spain	Los Pobres. Lucios De Beta La Plama (Consolidated)	1991	4300	J	17
Spain	Embalse De Orellana	1993	4150	J	17
Spain	Embalse De Buendía (Cu)	2003	4122	J	17
Tunisia	Lac Ichkeul	1997	7450	J	17
Turkey	Sultansazligi(Yay+Col+Kurbaga)	1999	23732	J	17
Turkey	Goksu Delta (Silifke)	1992	14952	J	17
Turkey	Tuzla Golu (Ceyhan Delta)	1990	12600	J	17
Turkey	Meric Delta	1999	12400	J	17
Turkey	Camalti Salt Pans; Gediz Delta	1999	11532	J	17
Turkey	Demir Kopru Baraji	1992	10410	J	17
Turkey	Kizilirmak East (Balik)	1999	9700	J	17
Turkey	Akyatan Golu	1996	8471	J	17
Turkey	Kizilirmak (Karabogaz+Balik)	1995	7781	J	17
Turkey	Koycegiz Golu	1996	5340	J	17
Turkey	Kizilirmak West (Karabogaz)	1996	5200	J	17
Turkey	Esmekaya Golu	1996	5020	J	17
Turkey	Tuz Golu West (Tersakan+Bulok)	1993	4950	J	17
Turkey	Yemisli Golu(10Km N.Of Karatas	1996	4092	J	17
Turkey	Menderes Delta	1996	4000	J	17
Turkmenistan	Tedzhen (Tejen) Reservoir 2	1997	32234	J	17
Turkmenistan	Khauzkhan Reservoir	2000	28700	J	17
Turkmenistan	Balkhan Gulf (Convention Mar)	2003	18731	J	17
Turkmenistan	Lake Sarykamysh	1997	16000	J	17
Turkmenistan	Kopetdag Reservoir	1998	13100	J	17
Turkmenistan	Lake Soltantagt	1996	13000	J	17
Turkmenistan	Amudarya Valley: Kerki-Karabekaul	1990	10280	J	17
Turkmenistan	Lake Ketdeshor (Kattashor)	1996	10000	J	17
Turkmenistan	Amudarya Valley: Karabekaul-Chardjev	1990	7320	J	17
Turkmenistan	Amudarya Valley: Chardjev-Cheidi (Neftezavodsk)	1990	5170	J	17
Turkmenistan	Dzharsai River Floodplains (Jarsay Collector)	2000	5073	J	17
Turkmenistan	Mikhaylov Gulf (Convention Mar)	2003	5017	J	17

Table 2.24 continued: Common Teal *Anas crecca*

Country	Sitename	Year	Count	Type	Ref.
Turkmenistan	Caspian Coast: Gasankuli-Guyjuk	1991	4649	J	17
Turkmenistan	Lower Atrek River: Total	1999	4280	J	17
United Kingdom	Somerset Levels	2003	33350	J	17
United Kingdom	Mersey Estuary	1997	14120	J	17
United Kingdom	Thames Estuary	2003	9357	J	17
United Kingdom	Lower Derwent Ings	1995	6576	J	17
United Kingdom	Hamford Water And Naze Combined	1997	6563	J	17
United Kingdom	Chew Valley Lake	1991	5500	J	17
United Kingdom	Ouse Washes	1991	5225	J	17
United Kingdom	Ribble Estuary	1999	5068	J	17
United Kingdom	Swale Estuary	2003	4972	J	17
United Kingdom	Abberton Reservoir	1991	4784	J	17
United Kingdom	WWT Martin Mere	2002	4460	J	17
United Kingdom	North Norfolk Coast	2002	4323	J	17
Uzbekistan	Syrdarya River . Fergana Valley-Chardara Reservoir	2004	24288	J	17
Yugoslavia	Skadarsko Jezero	1993	40000	J	17

2.14.2 Common Teal movements

The Common Teal breeds in a large area in the northern Palearctic, from Iceland to the absolute eastern part. The closely related Green-winged Teal *Anas carolinensis* breeds in North America. The Common Teal is mainly migratory, but small populations in west Europe are largely resident. Wintering areas are found in Europe, North Africa and Asia.

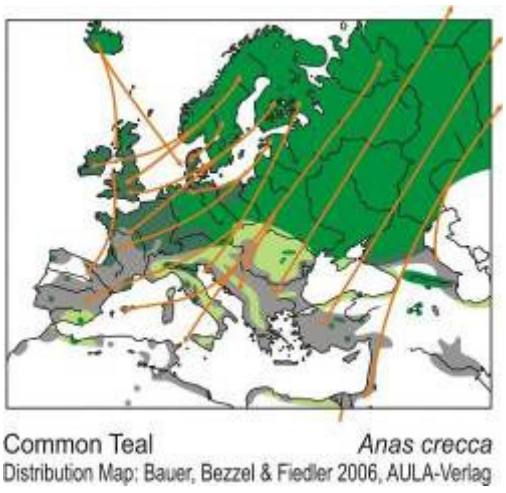


Figure 2.27: Map depicting the movements of Common Teal (*Anas crecca*) based on published information and ring recoveries in the EURING Data Bank.

The largest numbers of recoveries are from birds ringed in Britain, the Netherlands, Denmark and Russia. Between December and March, recoveries are reported in a large area of west and south Europe as well as in the area of the Black Sea and the Caspian Sea. A few recoveries are reported also in North Africa and in the Middle East. Small numbers cross the Sahara desert and there are two recoveries supporting this movement. Between January and February there is a decrease in the number of recoveries in Northen Africa, while March shows a clear decrease in recoveries in Iberia and a further increase in Northern Italy. The speed of return migration seems to increase significantly during April and be directed northeast on a broad front. Recoveries from the breeding season (May-June) are spread out in northern Europe and Russia east to about 70°E.

The autumn migration seems to start in July and continue until October. The autumn migration of the Common Teal is directed southwest and different flyways parallel to each other are known to exist. The population breeding east of the Ural Mountains and in Siberia winters in the eastern Mediterranean, the Black Sea and the Caspian Sea area. Some birds are known to follow the river Nile south to East Africa. Siberian birds also winter on the Indian subcontinent. In severe winters, Common Teals in west Europe continue to the Atlantic coast and south to northwest Africa. It has been shown from ringing recoveries that birds in different seasons can change between flyways.

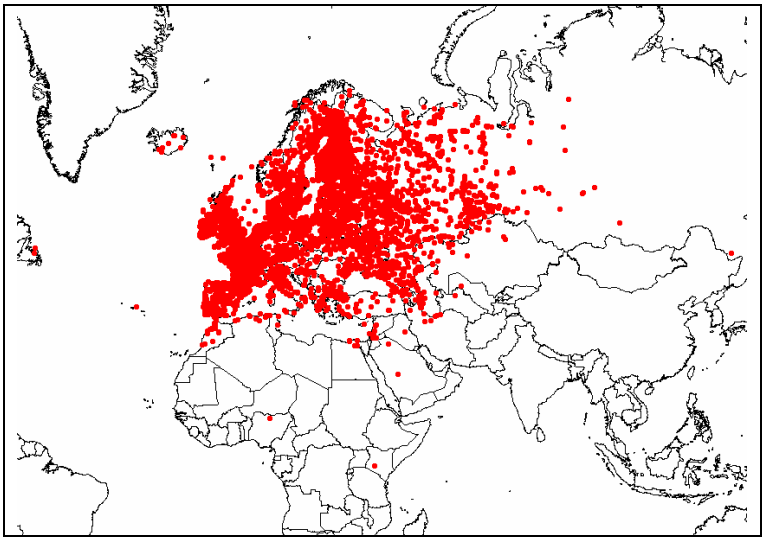
Table 2.25: Summary of the movements of Common Teal (*Anas crecca*) from the literature based on published information and ring recoveries in the EURING Data Bank.

Common Teal *Anas crecca*

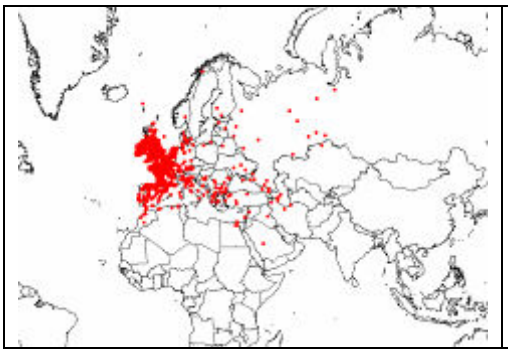
Distribution: Holarctic, across North America and northern Eurasia. Three subspecies: nominate in Northern Eurasia; *A.c.carolinensis* in North America; *A.c. nimia* in the Aleutian Islands Western Eurasian populations winter south to North Africa and the Gulf. Main wintering areas: Northwest Europe, Black Sea/Mediterranean, Southwest Asia. Wintering sites may change from one year to another.

Moult: discrete moult migration in West and Central Europe (Denmark, Netherlands, SE-Germany), Teal breeding in SW-Siberia complete wing moult at lakes in SW-Siberia as well as along the northern Caspian Sea shore

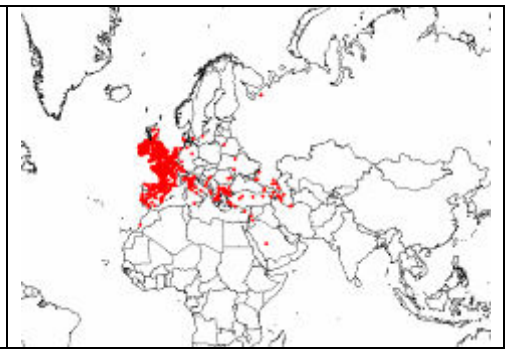
Population (or part of population)	Autumn Migration		Wintering / Non-breeding Grounds		Spring Migration		References
	direction / via	during	location	during		direction / via	during
No discrete populations identified		(July) Europe: Oct-Nov					1
Western Eurasia			south to North Africa, the Gulf, few into West and East Africa and Arabian Peninsula				8
Fennoscandia, the Baltics, NW-Russia (East as far as Taimyr), N-Poland, Germany, Denmark, Belgium	S-SW, passage via Denmark Sep-Oct, through Europe	July-Sep	Northwest Europe, Netherlands, Great Britain and Ireland, Denmark, France, Italy, Spain, as far east as Southern Black Sea region, Northern Africa (Morocco).	peak in Dec.		Mar	1, 2, 5, 6, 7, 8,9, 12
Iceland, through Scandinavia to NW-Siberia			Britain and Ireland, Denmark, Netherlands, France				3, 8
Britain, Ireland, Netherlands, France, Spain			(largely sedentary)				3, 8
Siberia			Eastern Mediterranean, Black Sea, East Africa, Caspian region, Indian subcontinent, east & southeast Asia				3, 11
Western Siberia, west-central Russia, central Europe			West Mediterranean				2, 5, 8
Central Siberia			Southwest Asia, SE-Europe, Caspian region, Netherlands				1, 2, 8, 11
Central Russia, Ukraine east to Volga-Kama river basins and Trans-Ural region			East Mediterranean, Egypt	more direct course back to breeding ground			8, 14
Caucasus, East of Urals (Ob and Irtysh river)			Egypt, few to Southern Sahara, e.g. Senegal, Chad.				8, 14



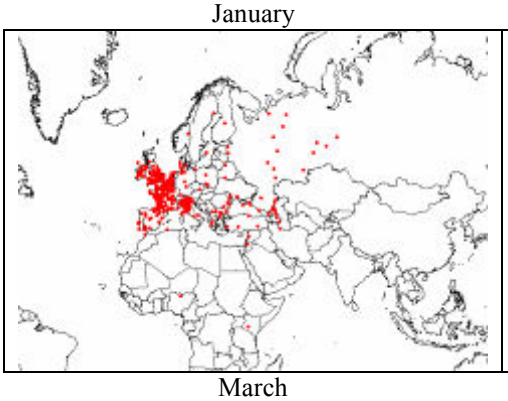
Finding locations of all dead birds



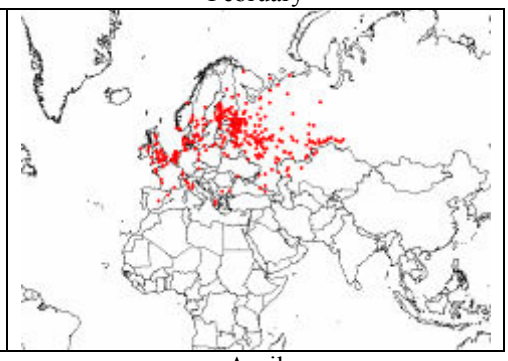
January



February



March



April

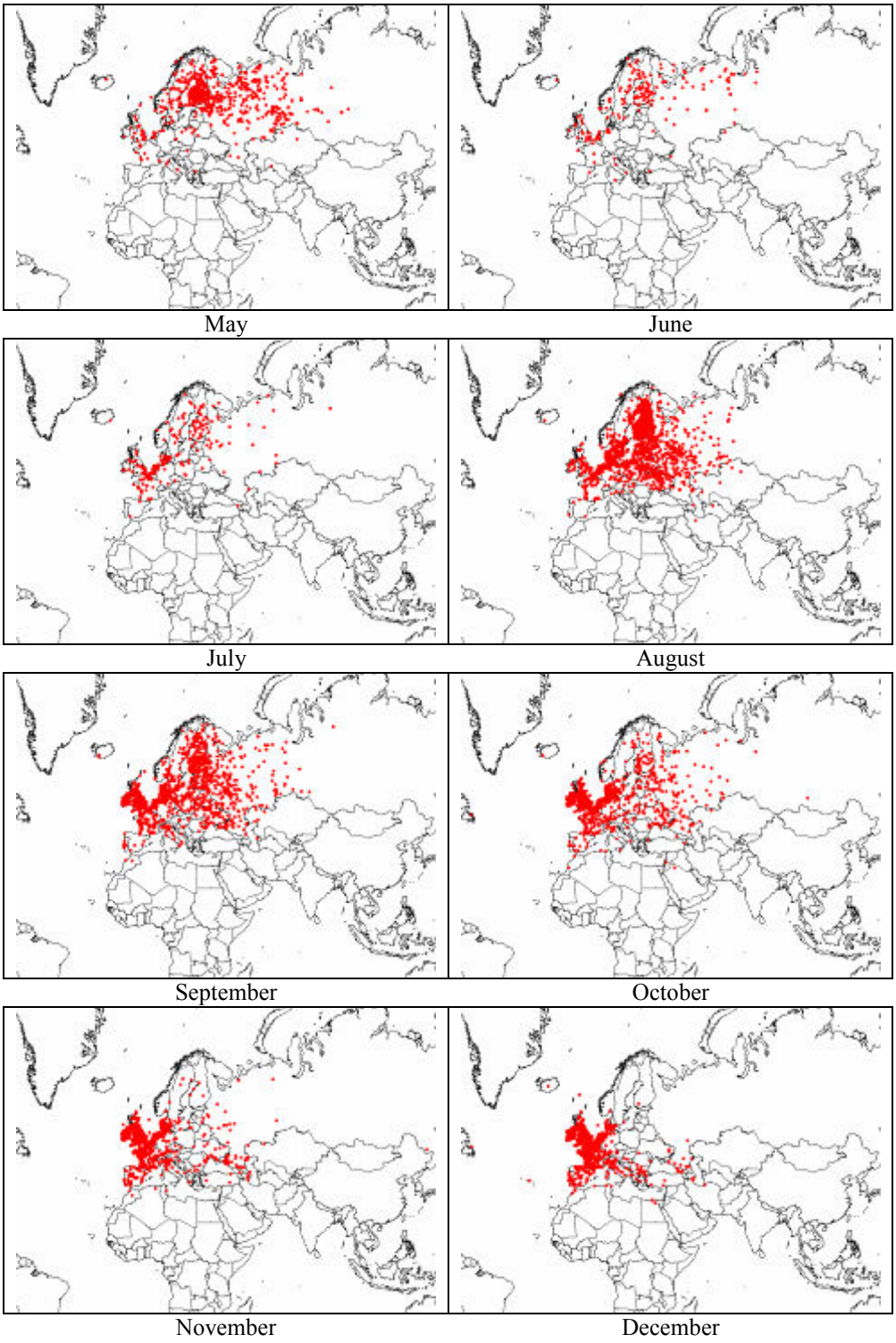


Figure 2.28: Finding locations of all dead Common Teal (*Anas crecca*) in the EURING data bank. All birds are presented and also broken down by month.

2.15 Mallard (*Anas platyrhynchos*)

2.15.1 Numbers and Distribution

Mallard is the most numerous and widespread duck species in Europe and is only absent in January from upland areas and those affected by prolonged freezing (Figure 2.29). It has a similar winter distribution to Common Teal but is more abundant and more tolerant of freezing conditions, occurring in high numbers further east and north than any other freshwater duck species. High densities of important sites are found in a large area encompassing Belgium, The Netherlands, northern Germany and Denmark and a smaller area centred on Hungary and Croatia. There are also large numbers of key sites on the northern and western coasts of the Black and Aegean Seas in Russia, Ukraine, Romania, Bulgaria and Greece. Spain, France, Switzerland, Italy and Albania also host important key sites. Some of the highest counts of all have been made in Uzbekistan, Turkmenistan, Azerbaijan and Iran, especially along the shores of the southern half of the Caspian Sea and in lakes of southern Iran.

The highest counts have been made in Iran, Uzbekistan, Azerbaijan, and Turkmenistan, and in Europe the highest site totals are recorded in Eastern, Southern and Central European countries, with rather few Key Sites in the West and North (Table 2.26). At Bakhtegan and Tashk Lakes, Iran, over 300,000 were counted in 1995. Kuyumasar, Uzbekistan recorded 134,000 in 2004, and Gyzylagach Nature Reserve, Azerbaijan, 93,000. In the Black Sea-East Mediterranean region, 62,210 were counted at Shabla Lake (Bulgaria) in 1997, 52,350 at The Evros Delta (Greece) in 2000, and 50,000 at Kopacki Rit (Croatia) in 1998, as well as 49,818 in the Central Sivash (Ukraine) in 1998. Other important sites in this region are Eastern Sivash (Ukraine) where 40,000 were counted in 1991, and the Black Sea Biosphere Reserve where there were 38,300 in 1990. Further west in the Mediterranean region, the peak count at Venice Lagoon, Italy, was 46,156 in 2002, and in the Camargue, France, 41,143 also in 2002. The Ebro Delta, Spain recorded 43,160 in 1997. Further north and west, 41,916 were counted at Dümmer, Germany in 1998, and 37,850 were counted at Cours du Rhin (France) in 1990. The highest count in Hungary was 30,000 at Geszt. Begecsi Halastavak in 2002, and 25,000 were recorded at three further sites.

Table 2.26: Mallard *Anas platyrhynchos*: Peak counts between 1990 and 2005 at sites in Europe, West and Central Asia where 8,000 or more have been recorded.

Country	Sitename	Year	Count	Type	Ref.
Austria	March	2001	8860	J	17
Azerbaijan	Caspian Coast: Gyzylagach Nature Reserve		93000	J	17
Azerbaijan	Kirov Bay	1991	36730	J	17
Azerbaijan	Shah Cape (Apsheron Archipelago Tara Islands)	1996	23126	J	17
Belarus	Minsk Town Waterbodies	2000	8200	J	17
Bulgaria	Shabla Lake (+ Ezeretz)	1997	62210	J	17
Bulgaria	Danube: Tutrakan-Silistra Toutrakan - Silistra	1999	23143	J	17
Bulgaria	Tzerkovski Tserkovski Reservoir	1997	22755	J	17
Bulgaria	Piasachnik Reservoir	1999	20000	J	17
Bulgaria	Danube: Russe-Tutrakan Rouse	1999	10115	J	17
Bulgaria	Garvanovo Dam	1993	10037	J	17
Bulgaria	Durankulak Lake Complex	2000	8851	J	17
Bulgaria	Ovcharitza	1996	8400	J	17

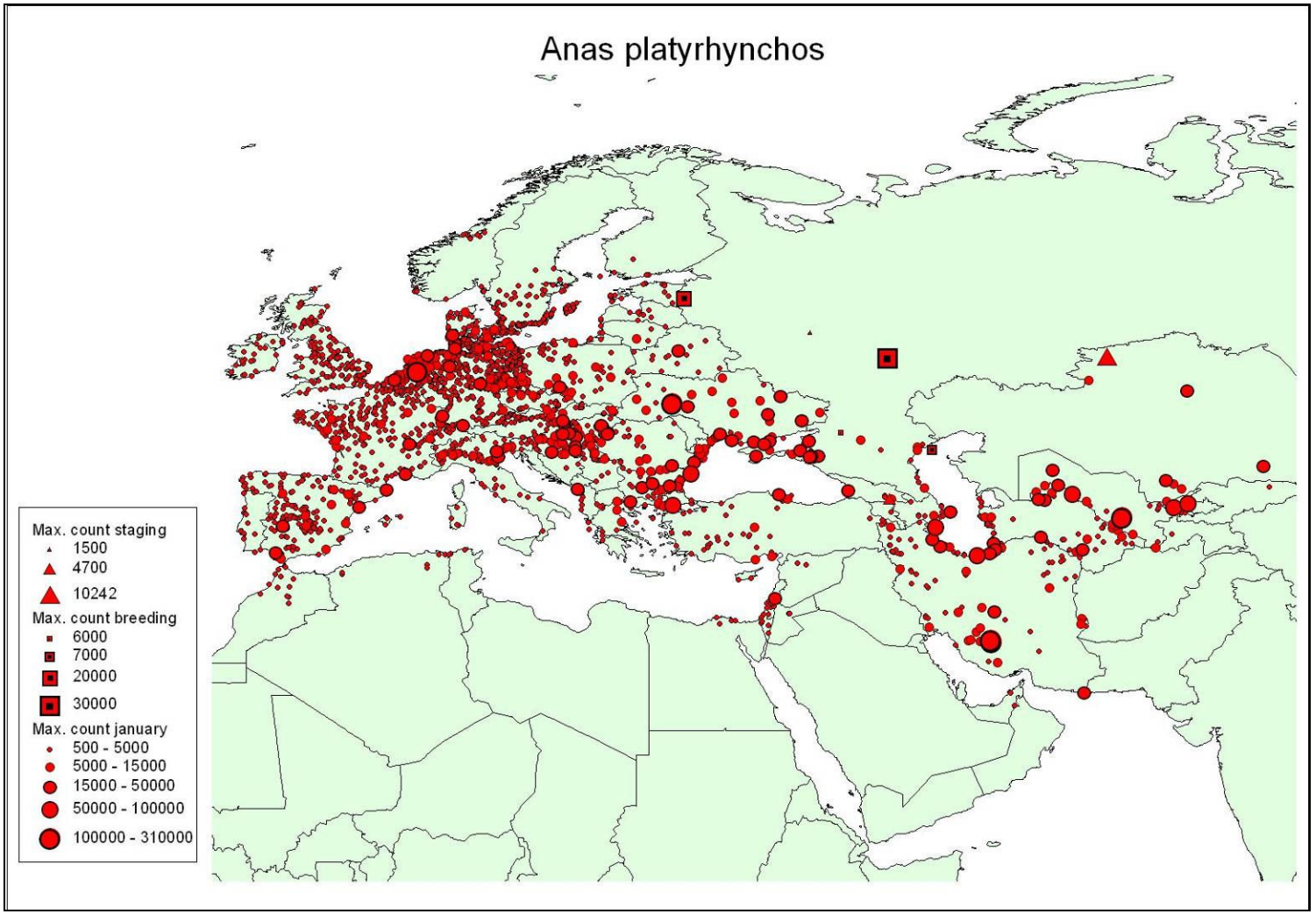


Figure 2.29: Mallard *Anas platyrhynchos*: Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 500 or more have been recorded.

Table 2.26 continued: Mallard *Anas platyrhynchos*

Country	Sitename	Year	Count	Type	Ref.
Croatia	Kopacki Rit	1998	50000	J	17
Croatia	Dunav: Batina	1990	30000	J	17
Croatia	Park Prirode Lonjsko Polje (Lonjsko Polje Nature Park)	1999	22185	J	17
Croatia	Ribnjacarstvo (Slavonski Brod Fishpond)	1992	11000	J	17
Czech	Nechranice Dam	1995	13428	J	17
Czech	Nove Mlyny I & Iidam Systems	1994	12595	J	17
Denmark	Danish Wadden Sea	1991	20164	J	17
Denmark	Lolland NW	1991	12038	J	17
France	La Camargue	2002	41143	J	17
France	Cours Du Rhin (67 / 68)	1990	37850	J	17
France	Dombes-Vallée De L'Ain	2000	19841	J	17
France	Lac De Grandlieu	2003	11950	J	17
France	Etangs De La Brenne	2003	10551	J	17
France	Baie De L'Aiguillon Et Pointe D'Arcay	2002	9649	J	17
France	Alsace Hors Rhin (67 / 68)	1999	8486	J	17
Georgia	Paliastomi Lake	1998	34400	J	17
Germany	Dümmer	1998	41916	J	17
Germany	Wattenmeer Sh 12	1992	18329	J	17
Germany	Wattenmeer Sh 10	1991	16554	J	17
Germany	Stausee Dachwig	1990	16000	J	17
Germany	Vorland Jadebusen	1995	14750	J	17
Germany	Wattenmeer Sh 13	1992	13686	J	17
Germany	Rhein: Breisach - Nonnenweier	1990	12280	J	17
Germany	Donau: Km 2246-2405	2002	11743	J	17
Germany	Rhein: Weil-Breisach	1992	10375	J	17
Germany	Wattenmeer Sh 08	1991	10168	J	17
Germany	Rhein: Nonnenweier-Kehl	1990	9518	J	17
Germany	Weser: Strohauser Plate	1991	8877	J	17
Germany	Wattenmeer Sh 11	2001	8844	J	17
Germany	Wieck-Kooser See	1993	8333	J	17
Germany	Talsperre Spremberg - Spree Bei Bräsinchen	1990	8275	J	17
Germany	Zachariassee	1996	8200	J	17
Germany	Elbe Km 73-93.5 / Coswig - Meißen - Diesbar	1992	8000	J	17
Germ./Switz./Austr.	Bodensee Gesamt	1990	21000	J	17
Greece	Evros Delta	2000	52350	J	17
Greece	Kerkini	1995	22000	J	17
Greece	Vistonis (Bourou)	1998	9010	J	17
Greece	Karla Reservoirs (Former L.Karla)	1995	9000	J	17
Greece	Axios, Loudias & Aliakmon Deltas	1999	8971	J	17
Hungary	Geszt. Begecsi Halastavak	2002	30000	J	17
Hungary	Balaton: Total	1996	25000	J	17
Hungary	Hortobagy Halasto	1994	25000	J	17
Hungary	Soponyai-Halastavak	1993	25000	J	17
Hungary	Duna: 1791-1794 Fkm Gonyu	2002	23953	J	17
Hungary	Duna 2: Baja-Dunafoldvar	1992	20090	J	17
Hungary	Biharugrai Halasto	1999	16800	J	17
Hungary	Retszilas Halasto	2002	15070	J	17
Hungary	Bugyi	1990	15000	J	17
Hungary	Duna 1: Orsz. Hatar (=Border)-Baja	2000	15000	J	17

Table 2.26 continued: Mallard *Anas platyrhynchos*

Country	Sitename	Year	Count	Type	Ref.
Hungary	Csaj. Pusztaszer (Halasto) = Tomorkeny	1994	13000	J	17
Hungary	Nagyhegyes Elepi-H.To	2002	12000	J	17
Hungary	Sumony Halasto	1996	8000	J	17
Iran	Bakhtegan & Tashk Lakes	1995	308150	J	17
Iran	Fereydoon Kenar, Ezbaran & Sorkh Rud Damgahs: Damgah Fereydoon Ke	1991	80000	J	17
Iran	Miankaleh W.R. & Gorgan Bay: Miankaleh Protected Region	1991	42107	J	17
Iran	Gomishan Marsh	1991	40000	J	17
Iran	Caspian Coast (Gilan): Anzali- Astara	1998	37200	J	17
Iran	Govater Bay & Hur-E-Bahu: Bahookalat River	1994	26354	J	17
Iran	Paein Rud Posht Ab-Bandan	2003	25000	J	17
Iran	Anzali Mordab Complex: Siakeshim Protected Region	2003	19500	J	17
Iran	Kaftar Lake	1997	15000	J	17
Iran	Miankaleh W.R. & Gorgan Bay: Gorgan Bay	1998	14040	J	17
Iran	Anzali Mordab Complex: Anzali Marsh East	2003	13800	J	17
Iran	Anzali Mordab Complex: Anzali Mars West (Main Lagoon)	1992	13610	J	17
Iran	Dorodzan Dam	1995	12500	J	17
Iran	Aras River: Bralan - Aras Dam	1997	12000	J	17
Iran	Chookam Ab-Bandan	2003	11500	J	17
Iran	Anzali Mordab Complex: Selkeh Protected Region	2003	9800	J	17
Iran	Caspian Coast (Gilan): Astara - Hashtpar	2003	9800	J	17
Iran	Hamoun Lakes Complex: Kuh-I-Khajeh	1995	9668	J	17
Iran	Hamoun Lakes Complex: Hamoun-E-Saberi	1994	8928	J	17
Iran	Shadegan Marshes Protected Region: Total	2003	8422	J	17
Iran	Caspian Sea Coast (Mazandaran): Babolsar - Ashur	1998	8400	J	17
Iran	Maharloo Lake	1990	8000	J	17
Iran	Miankaleh W.R. & Gorgan Bay: Lapoo - Zaghmarz Ab-Bandan	2003	8000	J	17
Israel	Hula Valley	1991	20012	J	17
Italy	Laguna Di Venezia	2002	46156	J	17
Italy	Delta Del Po - Parte Veneta	2003	33243	J	17
Italy	F. Po - Tratto 7	2002	10698	J	17
Italy	F. Po - Tratto 6	2003	10489	J	17
Italy	F. Ticino - Tratto 3	2002	9439	J	17
Italy	Laguna Di Grado E Marano	1992	8600	J	17
Kazakhstan	Kurgaldjinskyi Reserve	1995	40160	J	17
Kazakhstan	Sorbulak Lake	1992	18000	J	17
Kazakhstan	Chuchkakol Lakes	2004	15800	J	17
Kazakhstan	Chardara Vdchr	1992	12000	J	17
Kazakhstan	Bilikol Lake	1992	10500	J	17
Kazakhstan	Kulykol-Taldykol Lake System	2000	10000	J	17
Kazakhstan	Lakes of Kustanay region	2003	10242	S	39
Netherlands	Westerschelde	2001	27832	J	17
Netherlands	Groningse Noordkust	1999	22179	J	17
Netherlands	Ijsselmeer	1999	14607	J	17
Netherlands	Oosterschelde	2001	14253	J	17
Netherlands	Haringvliet	2001	13749	J	17
Netherlands	Volkerakmeer	2002	13357	J	17
Netherlands	Texel	2001	12447	J	17
Netherlands	Grevelingen	1999	11420	J	17

Table 2.26 continued: Mallard *Anas platyrhynchos*

Country	Sitename	Year	Count	Type	Ref.
Netherlands	Krimpenerwaard	2001	11315	J	17
Netherlands	Markiezaat	1992	11286	J	17
Netherlands	Biesbosch	2001	11217	J	17
Netherlands	Eemmeer. Nijkerkernauw En Nuldernauw	1993	11030	J	17
Netherlands	Engbertsdijkvenen	1992	10600	J	17
Netherlands	Dollard	2001	10388	J	17
Netherlands	Tjeukemeer	1999	10073	J	17
Netherlands	Limburgse Maas	2001	9849	J	17
Netherlands	Veerse Meer	2001	9768	J	17
Netherlands	Friese Noordkust	1990	9480	J	17
Netherlands	Markermeer	2001	9329	J	17
Netherlands	Hollands Diep	1999	9310	J	17
Netherlands	Alblasserwaard	2001	8608	J	17
Netherlands	Ijssel	1999	8060	J	17
Poland	Odra: Krzepkowice-Brzeg Dolny (160 Km)	1993	22000	J	17
Poland	Stawy Milickie	1994	8900	J	17
Poland	Zbiornik Dzierzno	1996	8595	J	17
Poland	Odra: Chalupki-Krapkowice	1993	8279	J	17
Romania	Lake Sinoe (= Sinoie)	1990	21000	J	17
Romania	Delta Dunarii (Danube Delta)	1994	14033	J	17
Romania	Golesti	1991	9000	J	17
Romania	Lake Sinoe South	1991	8538	J	17
Romania	Strejesti	1995	8000	J	17
Russia	Penza Region		30000	B	9
Russia	Pskovsko-Chudskaya Lowland		20000	B	23
Russia	Kryukovskoye Reservoir		40240	J	17
Russia	Varnavinskoye Reservoir		28490	J	17
Russia	Group of limans between the Kuban and Protoka		22978	J	17
Russia	Krasnodarskoye Reservoir		20403	J	17
Russia	Shapsugskoye Reservoir		18110	J	17
Russia	Beisugsky Liman and Lake Khanskoye		15757	J	17
Russia	Kiziltashsky Liman Complex		12768	J	17
Russian Federation	Kochubeevskaya Borozdina	1991	12400	J	17
Russian Federation	Darginskiy Bank Gulf	1991	9000	J	17
Slovakia	Podunaji (Danube Floodplain)	1993	25701	J	17
Slovakia	Sl'Nava Reservoir	1993	13000	J	17
Slovakia	Zemplinska Sirava Reservoir	1994	13000	J	17
Slovenia	Drava: Ptuj	1999	9064	J	17
Spain	Delta Del Ebro (T)	1997	43160	J	17
Spain	Lucios De Beta La Palma-Isla Mayor (Se)	1999	29740	J	17
Spain	Embalse De Sierra Brava	2003	27150	J	17
Spain	Aiguamolls De L'emporda (Gi)	1994	16453	J	17
Spain	Parque Natural De La Albufera (V)	2003	10981	J	17
Spain	Tablas De Daimiel (Cr)	1992	10500	J	17
Spain	Laguna De Gallocanta (Z)	1990	9138	J	17
Spain	Laguna De Sariñena (Hu)	1990	8920	J	17
Spain	Embalse De Orellana	1991	8896	J	17
Turkey	Kizilirmak (Karabogaz+Balik)	1995	22765	J	17

Table 2.26 continued: Mallard *Anas platyrhynchos*

Country	Sitename	Year	Count	Type	Ref.
Turkey	Kizilirmak West (Karabogaz)	1996	10610	J	17
Turkey	Meric Delta	1996	10100	J	17
Turkey	Goksu Delta (Silifke)	1995	9870	J	17
Turkmenistan	Amudarya Valley: Druzhba-Nukus	1990	57450	J	17
Turkmenistan	Khauzkhan Reservoir	1997	42000	J	17
Turkmenistan	Lake Kernai (Aybugir)	1990	21500	J	17
Turkmenistan	Goigyrlan Floodlands	1990	17790	J	17
Turkmenistan	Caspian Coast: Gasankuli-Guyjuk	1991	17284	J	17
Turkmenistan	Kopetdag Reservoir	1998	16240	J	17
Turkmenistan	Lake Kornai	1995	15000	J	17
Turkmenistan	Lake Sarykamysh	1991	14330	J	17
Turkmenistan	Amudarya Valley: Kerki-Karabekaul	1994	12900	J	17
Turkmenistan	Soltandzhar Reservoir	1997	12316	J	17
Turkmenistan	Dzharsai River Floodplains (Jarsay Collector)	2000	11194	J	17
Turkmenistan	Balkhan Gulf (Convention Mar)	2003	10502	J	17
Turkmenistan	Tuyamuyun Reservoir	2003	8848	J	17
Turkmenistan	Amudarya Valley: Chardjev-Cheidi (Neftezavodsk)	1990	8550	J	17
Turkmenistan	Lake Soltantagt	2000	8131	J	17
Ukraine	Khmelnitsk (Region)	1994	111000	J	17
Ukraine	M. Sivash	1998	49818	J	17
Ukraine	Vinitsa (Region)	1992	43808	J	17
Ukraine	Donetsk (Region)	1993	42792	J	17
Ukraine	E. Sivash	1991	40000	J	17
Ukraine	Black Sea State Biosphere Reserve	1990	38300	J	17
Ukraine	Crimea (Region)	1990	34894	J	17
Ukraine	Dnepropetrovsk (Region)	1994	25989	J	17
Ukraine	Tiligulsky Liman	2001	25230	J	17
Ukraine	Kharkov (Region)	1994	17733	J	17
Ukraine	Utl'Ukskij Liman	1991	15712	J	17
Ukraine	Lake Kitai	1996	14130	J	17
Ukraine	Sasyk Liman + Adjacent Sea Area	1991	14000	J	17
Ukraine	Poltava (Region)	1990	13332	J	17
Ukraine	Zaporozhye (Region)	1993	12653	J	17
Ukraine	Zhitomir (Region)	1993	12088	J	17
Ukraine	Cherkassi (Region)	1990	11534	J	17
Ukraine	Danube Delta	1993	10840	J	17
Ukraine	W. Sivash	1991	10000	J	17
Ukraine	Secondary Delta Of The Kiliya Channel (Danube)	2000	9882	J	17
Ukraine	Area Northeast Of Odessa	1999	9000	J	17
Ukraine	Lvov (Region)	1993	8848	J	17
Ukraine	Kherson (Region)	1994	8380	J	17
Uzbekistan	Kuyumasar	2004	134086	J	17
Uzbekistan	Tuyabuguz Reservoir	2004	72658	J	17
Uzbekistan	Syrdarya River . Fergana Valley-Chardara Reservoir	2004	50783	J	17
Uzbekistan	Dautkil Lake (Daudan)	1995	30000	J	17
Uzbekistan	Amudarya Valley: Nukus-Aral Sea	1990	29512	J	17
Uzbekistan	Amudarya River (High Part Of The Stream)	2004	14057	J	17
Uzbekistan	Dengizkul Lake	2004	8320	J	17
Uzbekistan	Talimardzhan Reservoir	2004	8139	J	17

Table 2.26 continued: Mallard *Anas platyrhynchos*

Country	Sitename	Year	Count	Type	Ref.
Yugoslavia	Skadarsko Jezero	1993	30000	J	17
Yugoslavia	Uzdin-Idvor-Sakule	1997	10000	J	17
Yugoslavia	Zrenjanin (Banat)	1996	8500	J	17
Yugoslavia	Dunav: Ram	1990	8000	J	17
Yugoslavia	Jazovo Fish Pond	1996	8000	J	17

2.15.2 Mallard movements

The breeding area of the Mallard covers a large part of the Holarctic, across North America and Eurasia between 35°N and 70°N. Birds breeding in temperate areas are mainly sedentary while birds breeding in northern areas, where open waters are hard to find during winter, are migratory. The Mallard winters in a large part of Europe and across central Asia.

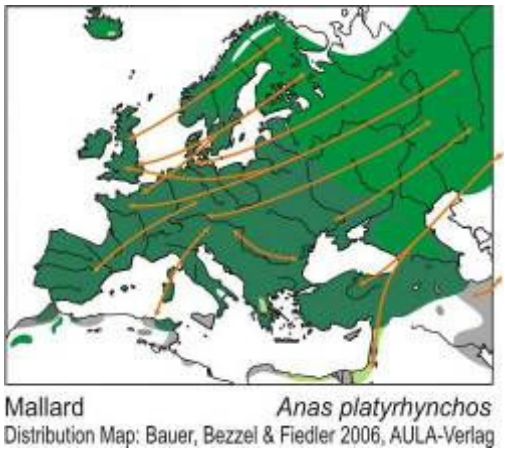


Figure 2.30 Map depicting the movements of Mallard (*Anas platyrhynchos*) based on published information and ring recoveries in the EURING Data Bank.

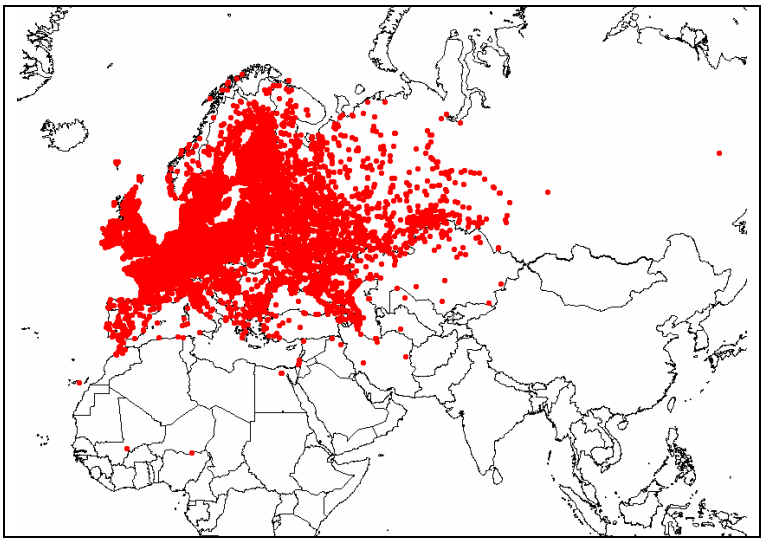
Extensive ringing of Mallards has been carried out in many countries and the largest numbers of recoveries are from birds ringed in Britain, Denmark, the Netherlands, Sweden and Russia. Recoveries between December and February are strongly concentrated in west Europe, from southern Sweden southwards, but many recoveries are also reported in south Europe and in the area of the Black and the Caspian Sea. Between January and February there is a decrease in recoveries in Mediterranean countries like Italy and SW France; this pattern gets stronger and involves also Iberia between February and March. The most intense phases of return migration seem to take place in March and continue into May in the most northern areas. During the breeding season, Mallards are found in most of Europe, including the northernmost areas, and eastward to about 70°E. The autumn migration seems to start in August and continue until November. Various flyways have been demonstrated and birds breeding in northwest Russia, Finland, Sweden and the Baltic states migrate to wintering areas in west Europe and Britain & Ireland. Birds breeding in west and southwest Europe are mostly sedentary or perform only short-distance movements. Birds from central and eastern Europe move south or southeast to the Mediterranean or to the Black Sea. Mallards breeding in central Russia, western Siberia and Kazakhstan move WSW-SSW to east Mediterranean, the Black Sea and the Caspian Sea, but also to areas east of the Caspian Sea and south to Iran-Afghanistan. Large numbers of males from breeding areas in Ukraine to west Siberia are known to gather in the Volga delta, Caspian Sea, during moult. Severe winters result in Mallards moving further south or southwest.

Table 2.27 Summary of the movements of Mallard (*Anas platyrhynchos*) from the literature based on published information and ring recoveries in the EURING Data Bank.

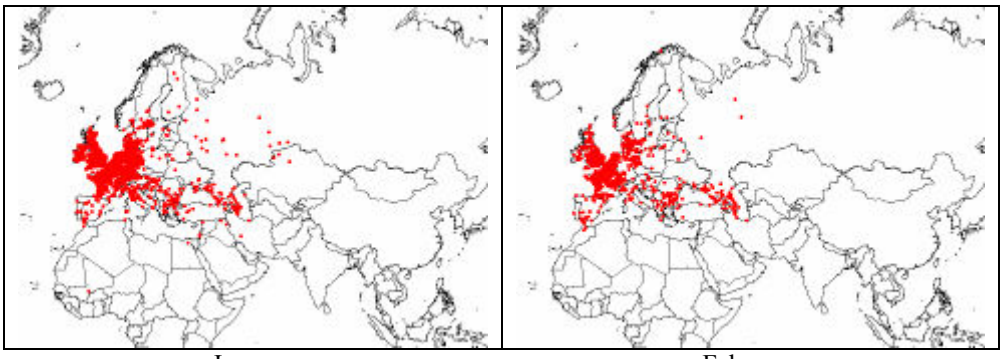
Mallard *Anas platyrhynchos*

Distribution: Holarctic, across North America and northern Eurasia from 70°N to 35°N in North Africa and 20°N in the Middle East. At least 4 subspecies. Northern birds are generally migratory, birds from temperate regions sedentary or dispersive

Population (or part of population)	Autumn Migration		Wintering / Non-breeding Grounds		Spring Migration		References
	direction / via	during	location	during		direction / via	during
Iceland			Iceland, Great Britain and Ireland				8
NW-Europe			(mainly sedentary; short distance migration in cold weather); few to Italy				1, 8
NW Russia		Nov	Denmark, NW-France, Great Britain, North Sea coasts, Baltics, Spain	Dec-Feb			3, 4, 6, 8
Belgium, Great Britain, Netherlands, Germany, Denmark, Sweden, Finland, Norway, Baltics, Poland		Aug-Dec	Great Britain, Ireland, Germany, Denmark, S-Sweden, Netherlands, France, Italy, Spain, Belgium, Norway, Baltics (birds from W-Baltics sed.), Finland, along North Sea coast	Nov-Feb		Mar-Apr	1, 2, 3, 4, 5, 7, 8, 9, 10, 11 , 12
SW-Europe			(mainly sedentary)				8
Central Europe			(manly sedentary); some migrate to wintering quarters around Mediterranean coast, and Black Sea; as well migration SE along the Danube, intermix with birds from further East at Black Sea				8, 12
former Czechoslovakia, S-European Russia			N-Africa, Italy, Germany, between Black and Caspian Sea, France, Spain, Hungary, Romania				10, 12
former USSR			Black Sea, east Mediterranean				8
NE-European Russia	mass moult in Kasakhstan, S-Siberia (probably birds from N-Russian and Northern Siberian)		between Black Sea and Caspian Sea, some Turkey and east Mediterranean, Kazakhstan, S-Siberia				8, 10, 11
S-Western Siberia (between Urals and Ob), Kazakhstan	WSW-SSW		Balkans to Black Sea, some Nile Delta, Greece, Caspian Region, Turkmenistan, Uzbekistan, Iran, Afghanistan, India				1, 8, 10, 11
N-central Siberia (between Ob and Irtysh)			Caspian region, central and S-Asian republics, W-Turkey, Pakistan and UAE/Saudi Arabia				1, 8

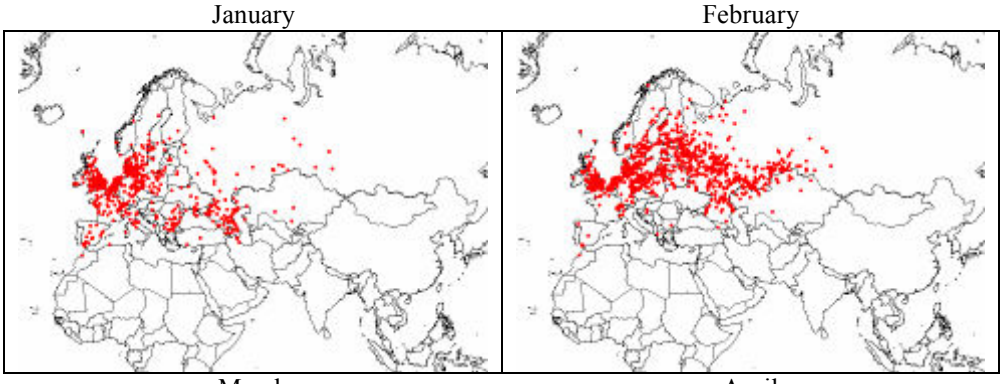


Finding locations of all dead birds



January

February



March

April

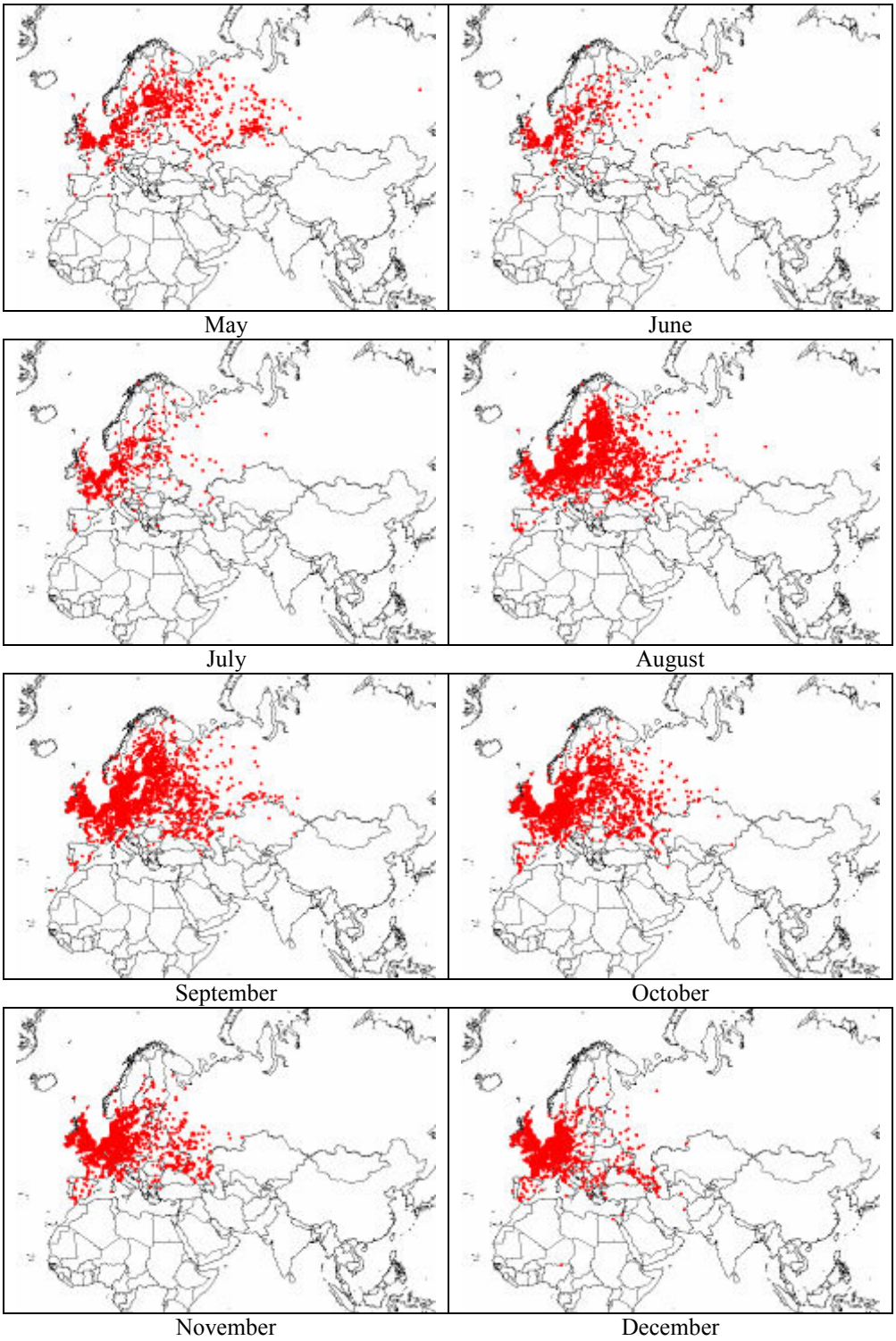


Figure 2.31: Finding locations of all dead Mallard (*Anas platyrhynchos*) in the EURING data bank. All birds are presented and also broken down by month.

2.16 Northern Pintail (*Anas acuta*)

2.16.1 Numbers and distribution

Northern Pintail is a significant migrant to Subsaharan Africa and Iran, and in Europe it is primarily a coastal species in winter (Figure 2.32). The most important wintering sites are in the Sahel zone of west Africa in Senegal, Mali, Niger, Nigeria and Chad. There are crucial wintering sites on the Caspian coast in Azerbaijan and Iran, and in lakes of southern Iran. In Europe, the most important countries in January are Greece, Spain, The Netherlands, France and UK, and Italy and Portugal are also important.

Between 100,000 and 150,000 have been counted at five sites, three of them in West Africa, and two in Iran (Table 2.28). These sites are two parts of The Inner Niger Delta in Mali, and the Djoudj National Park in Senegal, and in Iran, Ezbaran Damgah, and Bakhtegan and Tashk Lakes. Relatively few winter in Central Asia. Other key sites in West Africa include Lac Fitri, Tchad, where 36,865 were counted in 1999, Hadejia-Nguru, Nigeria, where there were 34,866 in 1998, and Diawling, Mauritania, where 33,100 were counted in 1995. The most important sites in Europe are in Greece, where 35,965 were couinted in the Evros Delta in 1999, and 12,477 at the Amvrakikos Wetlands in the same year. Spain is the only other European country where five-figure site totals have been recorded in January, with 28,790 at Caño Del Guadiamar in 1997, and 17,500 at Embalse de Gargáligas in 2003. Between 8,000 and 10,000 have been recorded in Italy at Venice Lagoon, in France at Baie De L'Aiguillon Et Pointe D'Arcy, in Spain at Marisma de Hinojos and Lucios de VetaLengua Y Aguias Rubia, and in The Netherlands at Westerschelde.

Table 2.28: Nothern Pintail *Anas acuta*: Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 2,000 or more have been recorded.

Country	Sitename	Year	Count	Type	Ref.
Albania	Karavasta Complex	1999	5895	J	17
Algeria	Lac Fetzara	1994	5810	J	17
Algeria	Marais De Mekhada	1992	3205	J	17
Algeria	Barrage De Boughzoul	1991	2500	J	17
Algeria	Les Lacs = Chott De Tinnsilt	1992	2400	J	17
Algeria	Sebkhet Djendli	1998	2000	J	17
Azerbaijan	Caspian Coast: Gyzylagach Nature Re		25000	J	17
Azerbaijan	Big Kyzyl-Agach Bay	1996	6536	J	17
Denmark	Danish Wadden Sea	2001	3660	J	17
Ethiopia	Shesher And Welala Marshes	2004	4350	J	17
France	Baie De L'Aiguillon Et Pointe D'Arcy	2003	8350	J	17
France	La Camargue	2004	6102	J	17
France	Etang De Carcans-Hourtin	2000	2770	J	17
France	Bassin D'Arcachon	1992	2590	J	17
France	Littoral Picard	2002	2565	J	17
France	Golfe Du Morbihan	1994	2350	J	17
Greece	Evros Delta	1999	35965	J	17
Greece	Amvrakikos Wetlands	1997	12477	J	17
Greece	Kerkini	1995	6600	J	17
Greece	Kotychi Lagoon	1996	2970	J	17
Greece	Messolonghi Lagoon	1998	2715	J	17
Iran	Ezbaran Damgah	2003	112500	J	17
Iran	Bakhtegan & Tashk Lakes	1995	101540	J	17

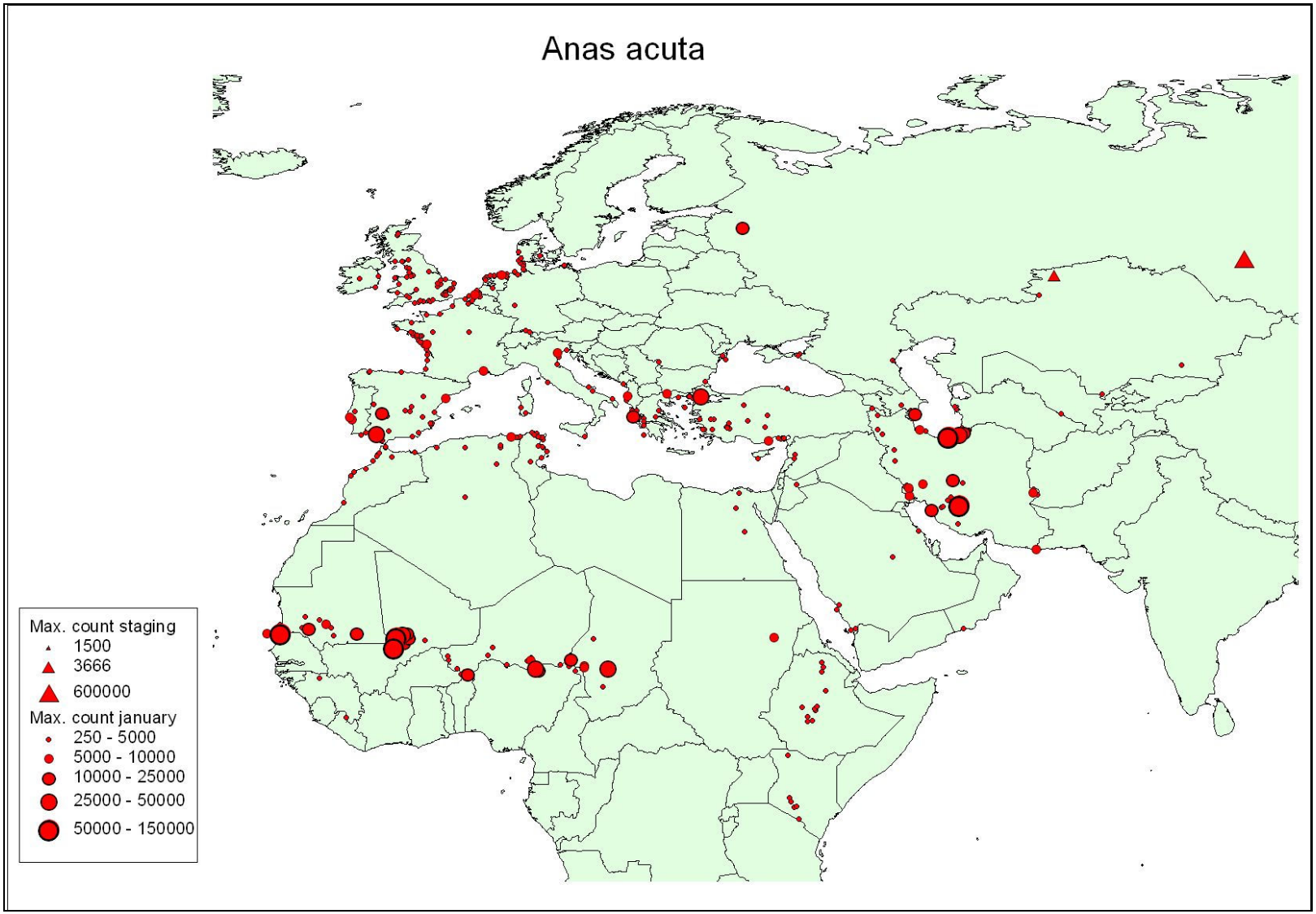


Figure 2.32: Nothern Pintail *Anas acuta*: Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 250 or more have been recorded.

Table 2.28 continued: Nothern Pintail *Anas acuta*

Country	Sitename	Year	Count	Type	Ref.
Iran	Fereydoon Kenar, Ezbaran & Sorkh Rud Damgahs: Damgah Fereydoon Ke	2003	73000	J	17
Iran	Miankaleh W.R. & Gorgan Bay: Mianka	1991	30412	J	17
Iran	Fereydoon Kenar, Ezbaran & Sorkh Rud Damgahs: Damgah Sork Kerud	2003	20700	J	17
Iran	Gavekhoni Marsh	1990	13256	J	17
Iran	Helleh River: River And Delta	1990	12000	J	17
Iran	Gomishan Marsh	1995	11500	J	17
Iran	Fereydoon Kenar, Ezbaran & Sorkh Rud Damgahs: Esbaran Marsh	1997	9500	J	17
Iran	Hamidieh Grassland	1994	8924	J	17
Iran	Govater Bay & Hur-E-Bahu: Bahookala	1995	7893	J	17
Iran	Hamoun Lakes Complex: Kuh-I-Khajeh	1997	7797	J	17
Iran	Miangaran Marshes: Miangaran & Izeh	1994	6560	J	17
Iran	Shadegan Marshes Protected Region:	2003	5615	J	17
Iran	Anzali Mordab Complex: Anzali Marsh East	1991	5310	J	17
Iran	Anzali Mordab Complex: Selkeh Prote	1992	4950	J	17
Iran	Maharloo Lake	1997	4950	J	17
Iran	Hamoun Lakes Complex: Hamoun-E-Sabe	1997	4711	J	17
Iran	Anzali Mordab Complex: Anzali Marsh West (Main lagoon)	2003	4700	J	17
Iran	Sorkhrood Damgah	1997	4500	J	17
Iran	Caspian Sea Coast (Mazandaran): Ban	1990	4445	J	17
Iran	Dasht-E-Arjan Marsh	1997	4123	J	17
Iran	Chah Nimeh Lake	1995	4018	J	17
Iran	Kaftar Lake	1993	3600	J	17
Iran	Sayed Mahali & Zarinkola Ab: Zarink	1993	2890	J	17
Iran	Ala Gol Marshes: Ala Gol	1993	2700	J	17
Iran	Amirlayeh & Sheikh Ali Kol: Amirlay	2003	2300	J	17
Iran	Sanandaj (Vahdat) Dam: Vahdat Dam	1995	2300	J	17
Italy	Laguna Di Venezia	2002	8981	J	17
Kazakhstan	Lakes of Kustanai region	2003	3666	S	39
Mali	Delta Quad`S 101,102,107-110,115-11	1994	150000	J	17
Mali	Delta Quad 33	2000	100000	J	17
Mali	Delta Quad 84	2001	35000	J	17
Mali	Delta Quad 20	2001	30000	J	17
Mali	Delta Quad 46	2001	26000	J	17
Mali	Delta Quad 74	2001	20150	J	17
Mali	Delta Quad 18	2001	15100	J	17
Mali	Delta Quad 40	1999	15000	J	17
Mali	Delta Quad 79	2001	11000	J	17
Mali	Delta Quad 65	2001	10000	J	17
Mali	Delta Quad 93 (Walado Debo)	1999	8000	J	17
Mali	Delta Quad 53	2000	7000	J	17
Mali	Delta Quad 45	2001	6500	J	17
Mali	Delta Quad 48	2001	6000	J	17
Mali	Delta Quad 39	1999	6000	J	17
Mali	Delta Quad 8	2000	5000	J	17
Mali	Delta Quad 22	2000	4200	J	17
Mali	Delta Quad 95	1999	3120	J	17
Mali	Delta Quad 75	2001	3000	J	17
Mali	Delta Quad 19	2001	2500	J	17
Mali	Delta Quad 24	1999	2000	J	17
Mauritanie	Diawling	1995	33100	J	17
Mauritanie	Mahmouda	2004	18360	J	17
Mauritanie	Lac De Mal	1999	12520	J	17
Mauritanie	Pn Diawling, Annexes, Dioup, Keur M	1999	10667	J	17

Table 2.28 continued: Nothern Pintail *Anas acuta*

Country	Sitename	Year	Count	Type	Ref.
Mauritanie	Tichilitt	1998	8100	J	17
Mauritanie	Bassin De R'Kiz	2001	6160	J	17
Mauritanie	Lac D'Aleg	2004	3236	J	17
Mauritanie	Tamourt Sawana	2000	3100	J	17
Mauritanie	Rosso, Toumbos Sud (Mohad)	2004	3033	J	17
Morocco	Merja Zerga: Kenitra	1992	3622	J	17
Netherlands	Westerschelde	2002	8325	J	17
Netherlands	Groningse Noordkust	2002	6090	J	17
Netherlands	Schiermonnikoog	2002	3567	J	17
Netherlands	Terschelling	1990	2847	J	17
Netherlands	Oosterschelde	2001	2395	J	17
Niger	Chiya	1995	11600	J	17
Niger	Gouske	2001	9187	J	17
Niger	Lac Tchad - Quadrat 16	2003	7800	J	17
Niger	Atchi	1995	5000	J	17
Niger	Parc Nationale Du "W"	1994	4070	J	17
Niger	Lassouri	1995	3800	J	17
Niger	Namga	1996	2600	J	17
Niger	Karandi	1996	2500	J	17
Niger	Tabalak	1994	2015	J	17
Nigeria	Hadejia-Nguru, All Quadrats	1998	34866	J	17
Nigeria	Hadejia-Nguru Wetland, Quad 13	1990	15886	J	17
Nigeria	Lac Tchad - Quadrat 51	2003	4160	J	17
Nigeria	Hadejia-Nguru Wetland, Quad 12	1990	3200	J	17
Portugal	Estuário Do Tejo	1999	7400	J	17
Portugal	Estuário Do Sado	1999	5410	J	17
Russia	Dvuobje total		900000	J	17
Russia	Il'men' Lake, Leningrad region		11500	J	17
Russia	West Siberia		600000	S	22
Senegal	Parc National Des Oiseaux Du Djoudj	2000	148675	J	17
Senegal	Ndiael	2002	14200	J	17
Senegal	Les Trois Marigots	1996	5200	J	17
Senegal	Zic De Djeuss Et Environs (Total)	1990	2500	J	17
Spain	Caño Del Guadiamar Pnd (H)	1997	28790	J	17
Spain	Embalse De Gargáligas	2003	17500	J	17
Spain	Marisma De Hinojos (H)	2000	8781	J	17
Spain	Lucios De Veta Lengua Y Aguas Rubia	1992	8000	J	17
Spain	Delta Del Ebro (T)	1999	7967	J	17
Spain	Caño Travieso (Se)	1997	7390	J	17
Spain	Lucios De Beta La Palma-Isla Mayor	1999	6536	J	17
Spain	Lucio De Los Ansares (Se)	2003	4731	J	17
Spain	Lucio Del Membrillo (H)	1992	4500	J	17
Spain	Embalse De Zújar - Serena	1993	2417	J	17
Spain	De Aguas Rubias Al Lucio Del Hondón	1997	2240	J	17
Spain	Parque Nacional De Doñana (Consolid	1991	2200	J	17
Sudan	Bagga Sites	2003	6620	J	17
Tchad	Lac Fitri	1999	36865	J	17
Tchad	Lac Tchad - Quadrat 17	2003	10300	J	17
Tchad	Lac Tchad - Quadrat 71	2003	9050	J	17
Tchad	Lac Tchad - Quadrat 60	2003	5220	J	17
Tchad	Bas Chari (Tchad)	1999	4138	J	17
Tunisia	Garaet Mabtouha	1991	2000	J	17
Tunisia	Sebkha Kelbia	1995	2000	J	17
Turkey	Goksu Delta (Silifke)	1992	5365	J	17
Turkey	Kizilirmak (Karabogaz+Balik)	1995	4184	J	17
Turkey	Kizilirmak East (Balik)	1999	3850	J	17

Table 2.28 continued: Nothern Pintail *Anas acuta*

Country	Sitename	Year	Count	Type	Ref.
Turkey	Yumurtalik Lagoons(Yapi+Omerg)	1999	2762	J	17
Turkey	Isikli Golu [Civril Golu]	1990	2000	J	17
Turkmenistan	Krasnovodsk Gulf (Convention Mar)(T	2004	2386	J	17
United Kingdom	Ribble Estuary	1999	3894	J	17
United Kingdom	Morecambe Bay	1999	3544	J	17
United Kingdom	Burry Inlet	1996	3541	J	17
United Kingdom	The Wash	1992	3503	J	17
United Kingdom	Mersey Estuary	1993	3042	J	17
United Kingdom	Solway Estuary (Scottish Counties)	2002	2910	J	17
United Kingdom	Nene Washes	1994	2313	J	17
United Kingdom	Duddon Estuary	1994	2194	J	17
United Kingdom	Ouse Washes	2000	2033	J	17

2.16.2 Northern Pintail movements

The breeding area of the Pintail covers a large area of the northern Holarctic, across North America and Eurasia. The Pintail is mainly migratory and in most regions is a long-distance migrant. Wintering areas are spread out in western and southern Europe, across Africa south of the Sahara, southwest Asia, India, southern China and Japan. North American Pintails move south and leave most of the breeding range during winter.

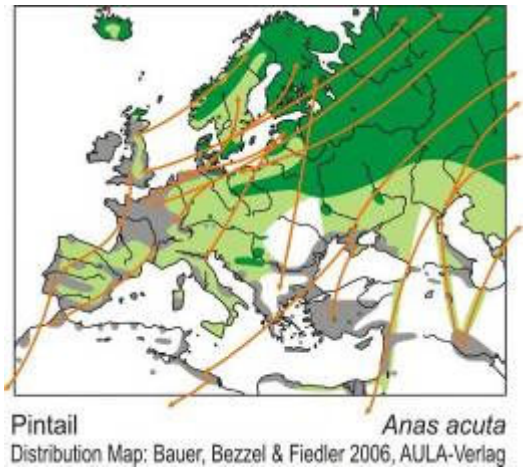


Figure 2.33: Map depicting the movements of Northern Pintail (*Anas acuta*) based on published information and ring recoveries in the EURING Data Bank.

Large numbers of recoveries are available only from birds ringed in Russia, Britain and the Netherlands. Recoveries from the period December – February are found in western and southern Europe, North Africa and in the area of the Black and Caspian Sea. A few recoveries are also reported from southwest Asia and India as well as from areas south of the Sahara in Africa. An increase in recoveries in Mediterranean countries like Italy is observed between January and February, becoming more intense between February and March. The most intense phases of return migration start in March, become prominent in southern Russia in April and reach the northernmost areas in May. Recoveries from the breeding season (May-June) cover a large area to about 80^{o}E, with concentrations of recoveries in southwestern Siberia and northern Kazakhstan. The autumn migration seems to start in August, but recoveries are spread out in Ukraine, western and southern Russia and in Kazakhstan as late as October. Birds breeding in Iceland, Sweden, Finland, the Baltic States and northwest Russia migrate SW-S mainly to west and south Europe and often along the Atlantic coast. Birds from western and central Siberia move to the Mediterranean, the Balkans and the area of the Black and Caspian Sea as well as to India. Some also move to western and southwestern Europe, and further to tropical West Africa. Birds from Siberia and northern Russia also winter in southwest Asia, the Nile Delta and in wetlands in Sudan and Ethiopia. Recoveries of ringed birds indicate that interchange between flyways in different years exists. Moult migration is common in Pintails and large numbers of males are known to gather in southwestern Siberia and northern Kazakhstan, where large concentrations of recoveries are found.

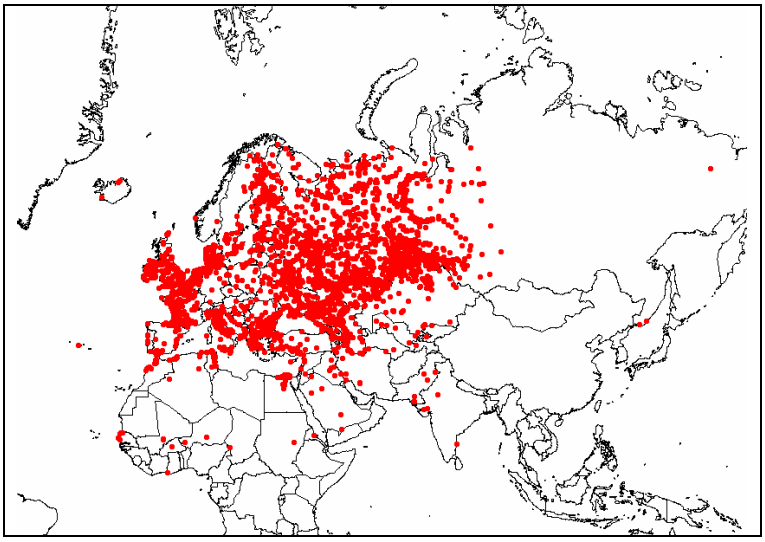
Table 2.29: Summary of the movements of Northern Pintail (*Anas acuta*) from the literature based on published information and ring recoveries in the EURING Data Bank.

Pintail ***Anas acuta***

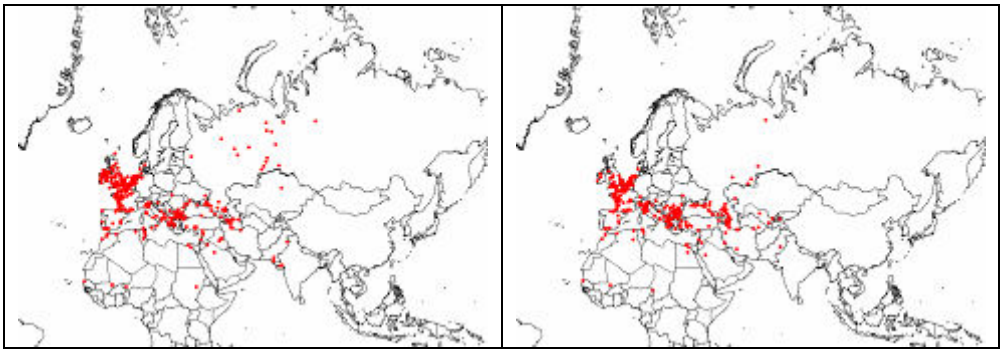
Distribution: Holarctic, across North America and northern Eurasia, in Western Eurasia between 60° and 70°N. No discrete populations defined main migration routes along the coasts. In winter, four basins distinguished: Mediterranean, Sudan, Niger, Chad; overlap between wintering groups in Western Eurasia and Africa.

Moult: moult migrations frequent, moulting areas in the Volga Delta, North Caspian region, SW-Siberia; mass moult migrations in Siberia

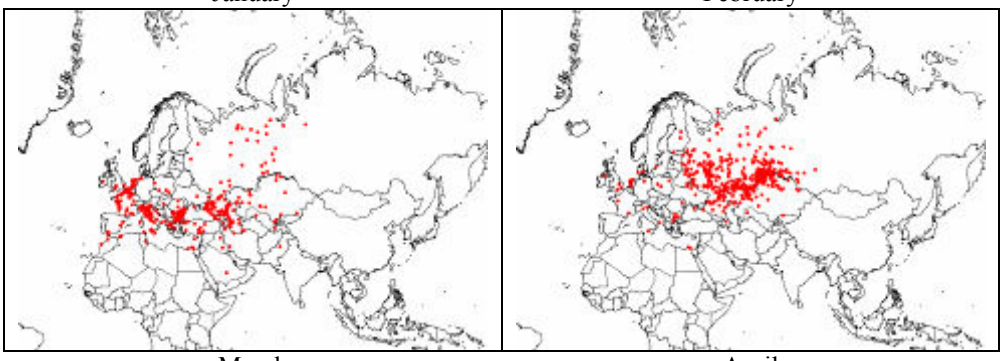
Population (or part of population)	Autumn Migration		Wintering / Non-breeding Grounds		Spring Migration		References
	direction / via	during	location	during	direction / via	during	
North America	exchange with Eastern Russia		North America and Central America, Japan				3, 10
Central Eurasia	probably moulting in Volga Delta, migration via Egypt		Sahel region (Senegal, Niger, Chad) of West Africa, Northwest Europe, the Mediterranean basin, eastern Africa, Southwest Asia south to the Gulf, India, China, Japan				2, 3, 8, 10, 11, 14
SW-Siberia moulting and breeding sites			along shores of Mediterranean, Black and Caspian Seas, Iraq and India, Egypt, wetlands in Sudan and Ethiopia				11, 14
European Russia and Western Siberia			Black Sea/Mediterranean region, Western Asia and Nile delta				1, 3, 5, 8, 12
Russia (Ob and Irtysh), western and central Siberia	moult in North Caspian region, migrate via Egypt		Netherlands, NW-France, Great Britain, as far as North Africa and Senegal delta				1, 2, 3, 8, 10
the Baltics, Scandinavia, Iceland			Northwest Europe, (Wadden Sea), Denmark, Netherlands, Italy				2, 5, 8, 12
Finland	mainly SW to SSW: Denmark, Benelux, South of Britain, French Atlantic Coast; Italy		Great Britain, along Atlantic coast, Italy, North Africa				2, 5, 11
Norway (rare breeder)		Aug-Nov	Scotland, few overwintering on coast north to Tromso, probably west coasts of Europe, possibly south to West Africa				9
Denmark (rare breeder)	SW		Great Britain, France, Spain, Belgium, Netherlands, Germany, few along Mediterranean	Dec-Feb			2, 5
Belgium			Camargue (France) and Guadalquivir Delta				7
Netherlands			France, Spain; few East as far as Egypt				14
Northwestern population	during cold weather movements		increases in Northern France (out of Dutch, German and Danish coasts), Iberia				8
Great Britain and Ireland			(mainly sedentary); passage through Britain on major flyway from northwest Siberia to subtropical Africa.				3



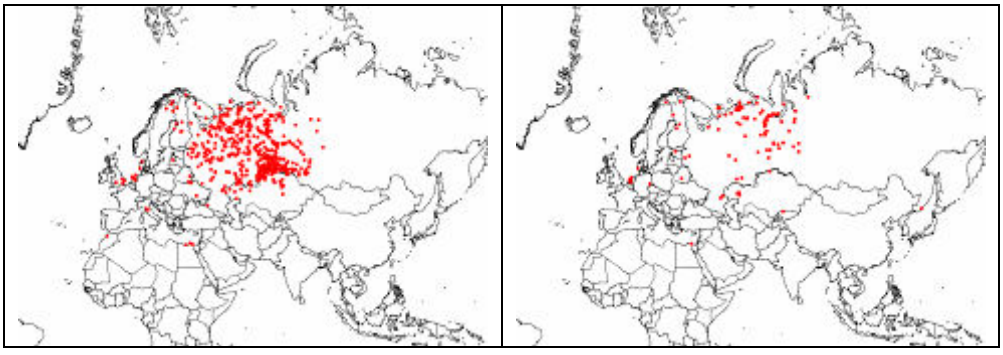
Finding locations of all dead birds



January February



March April



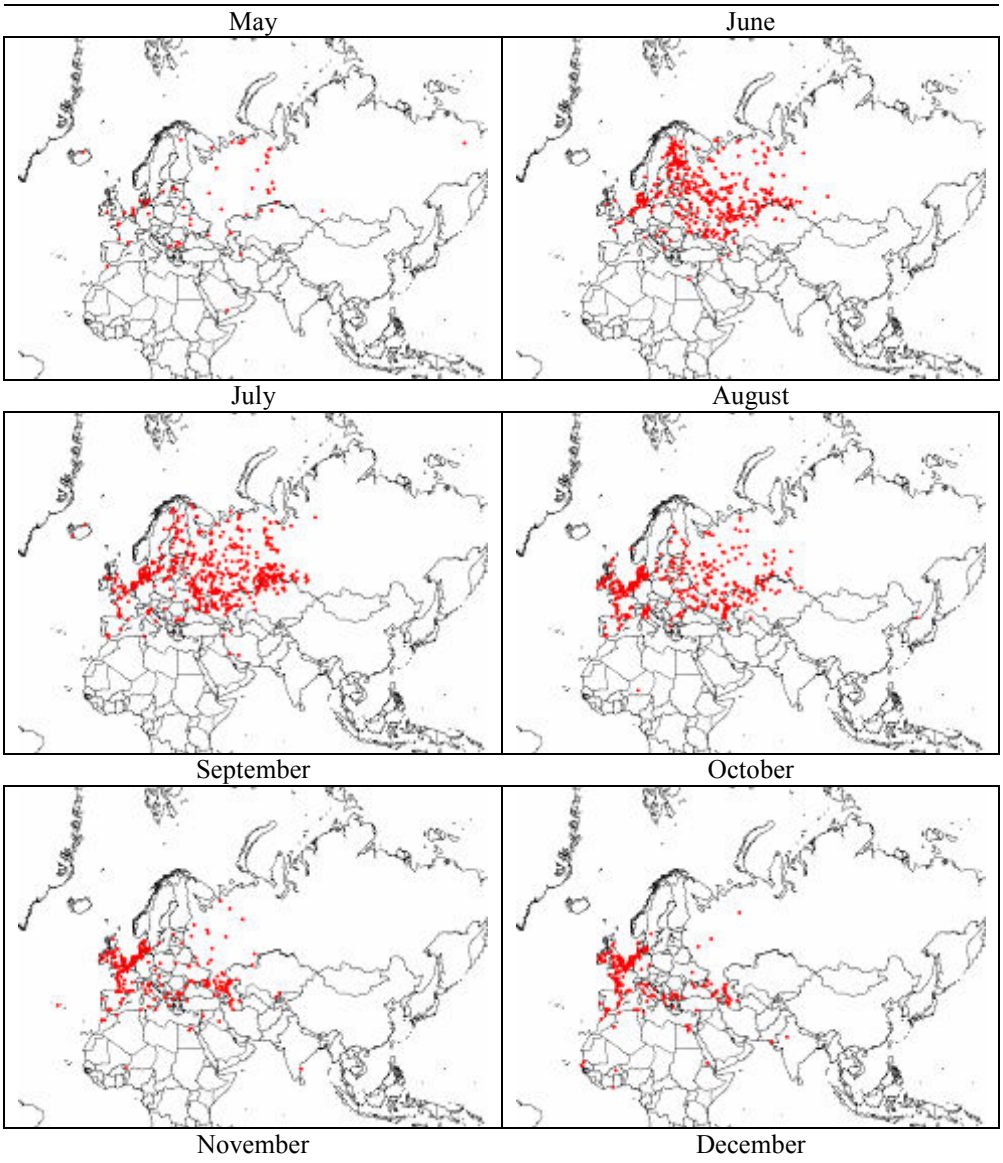


Figure 2.34: Finding locations of all dead Northern Pintail (*Anas acuta*) in the EURING data bank. All birds are presented and also broken down by month.

2.17 Garganey (*Anas querquedula*)

2.17.1 Numbers and distribution

Garganey is the most migratory of all Palearctic duck species and Russian and European breeding populations migrate almost entirely to sub-Saharan Africa and tropical Asia. There are numerous key wintering sites throughout the West African Sahel zone stretching from Senegal and Mauritania, through Mali, Burkina Faso, Niger, Nigeria, Chad and the northern tip of Cameroon (Figure 2.35). Smaller numbers spend the northern winter in East Africa from Sudan south to Kenya.. A number of important breeding areas have been identified in Russia, and spectacular numbers occur on migration on the Caspian coasts of Russia and Kazakhstan, and also, at least until the 1970s, in Egypt (Cramp & Simmons 1977). Much smaller numbers winter as far north as Azerbaijan.

The most important wintering sites for Garganey are the Djoudj National Park in Senegal, where 288,053 were counted in January 2000, and the Inner Niger Delta, Mali, where 206,000 were recorded in 1994, and where numerous five-figure counts of various quadrats have been made (Table 2.30). Lake Tchad in Tchad-Nigeria-Cameroon is a crucial site, but consolidated totals are not available and a count of 68,760 at Quadrat 93 in Cameroon is the highest count on record. In Mauritania, 57,272 were counted at Mahmouda in 2004, 50,350 at Lac d'Aleg in 1996 and 25, 475 at Bassin De R'Kiz in 2000. In Senegal, 31,500 were counted at Les Trois Marigots in 1998. In East Africa, the most important wintering sites are in Sudan, where 10,000 were counted at Bagga Sites in 2003, and 8,750 at Taror Ibrahim in 1997.

Table 2.30: Garganey *Anas querquedula*: Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 2,000 or more have been recorded.

Country	Sitename	Year	Count	Type	Ref.
Azerbaijan	Caspian Coast: Gyzylagach Nature Reserve		4000	J	17
Burkina Faso	Mare D`Oursi	1998	4458	J	17
Burkina Faso	Mare De Darkoy	2004	3500	J	17
Cameroun	Lac Tchad - Quadrat 93	2003	68760	J	17
Cameroun	Lac Tchad - Quadrat 86	2003	18050	J	17
Cameroun	Lac Tchad - Quadrat 101	1999	17618	J	17
Cameroun	Parc National De Waza Logone Total	1998	15347	J	17
Iran	Helleh River: River And Delta	1990	5000	J	17
Iran	Aras River: Bralan - Aras Dam	1997	2000	J	17
Iran	Ala Gol Marshes: Ala Gol	1993	1500	J	17
Kazakhstan	Kurgaldjinskyi Reserve	1995	7040	J	17
Kazakhstan	Kulykol-Taldykol Lake System	2000	3000	M	5
Kenya	Dandora Oxidation Ponds	1995	2730	J	17
Mali	Delta Quad`S 101,102,107-110,115-117,125	1994	206000	J	17
Mali	Delta Quad 46	2001	168000	J	17
Mali	Delta Quad 84	2001	100000	J	17
Mali	Delta Quad 93 (Walado Debo)	1996	100000	J	17
Mali	Delta Quad 20	2001	65000	J	17
Mali	Delta Quad 33	2000	65000	J	17
Mali	Delta Quad 91	2000	60900	J	17
Mali	Delta Quad 100	2000	60210	J	17
Mali	Delta Quad 44	2000	60000	J	17

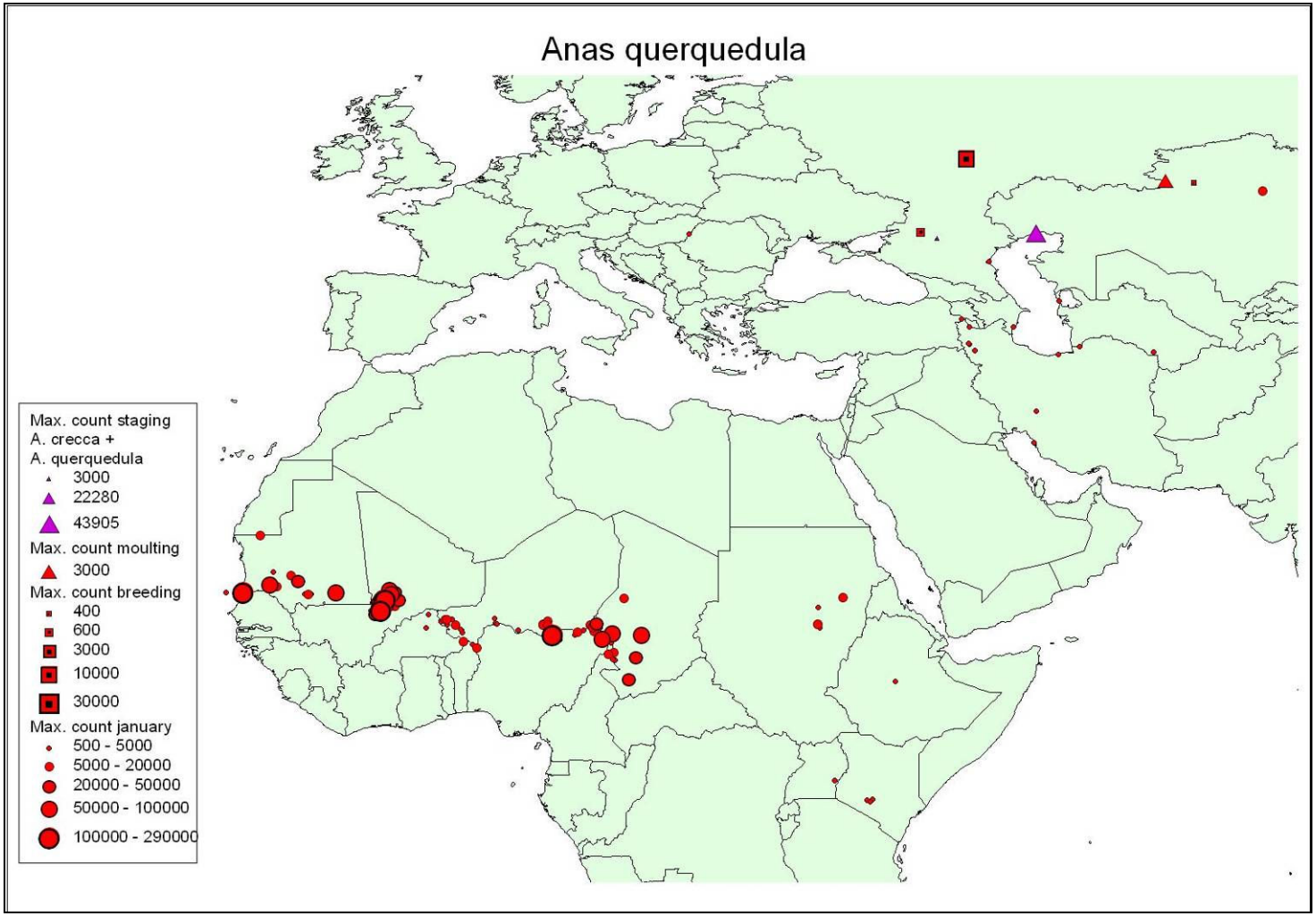


Figure 2.35: Garganey *Anas querquedula*: Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 500 or more have been recorded.

Table 2.30 continued: Garganey *Anas querquedula*

Country	Sitename	Year	Count	Type	Ref.
Mali	Delta Quad 8	2000	60000	J	17
Mali	Delta Quad 85	2001	48100	J	17
Mali	Delta Quad 101	2001	45000	J	17
Mali	Delta Quad 57	2000	40000	J	17
Mali	Delta Quad 75	2001	40000	J	17
Mali	Delta Quad 102	2001	35000	J	17
Mali	Delta Quad 17	2001	33100	J	17
Mali	Delta Quad 113	2001	32800	J	17
Mali	Delta Quad 107	2001	26600	J	17
Mali	Delta Quad 74	2001	22150	J	17
Mali	Delta Quad 53	2000	22000	J	17
Mali	Delta Quad 14	2000	20000	J	17
Mali	Delta Quad 99	2001	20000	J	17
Mali	Delta Quad 18	2001	17525	J	17
Mali	Delta Quad 45	2001	17000	J	17
Mali	Delta Quad 16	2000	16000	J	17
Mali	Delta Quad 58	2000	15000	J	17
Mali	Delta Quad 87	2001	14500	J	17
Mali	Delta Quad 22	2000	13700	J	17
Mali	Delta Quad 19	2001	13450	J	17
Mali	Delta Quad 90	2000	13000	J	17
Mali	Delta Quad 94	2001	12000	J	17
Mali	Delta Quad 88	2001	11300	J	17
Mali	Delta Quad 67	2000	10800	J	17
Mali	Delta Quad 95	2001	9000	J	17
Mali	Delta Quad 34	2000	8150	J	17
Mali	Delta Quad 24	2000	8000	J	17
Mali	Delta Quad 110	2001	7500	J	17
Mali	Delta Quad 72	2001	7300	J	17
Mali	Delta Quad 47	2000	5450	J	17
Mali	Delta Quad 40	2001	4600	J	17
Mali	Delta Quad 60	2001	4000	J	17
Mali	Delta Quad 79	2001	4000	J	17
Mali	Delta Quad 49	2001	3870	J	17
Mali	Delta Quad 114	2001	3000	J	17
Mali	Delta Quad 39	2001	2750	J	17
Mali	Delta Quad 38	2001	2200	J	17
Mali	Delta Quad 103	2000	2000	J	17
Mauritanie	Mahmouda	2004	57272	J	17
Mauritanie	Lac D`Aleg	1996	50350	J	17
Mauritanie	Bassin De R'Kiz	2000	25475	J	17
Mauritanie	Lac De Mal	1998	20000	J	17
Mauritanie	Tamourt Sawana	2000	16275	J	17
Mauritanie	Diawling	2002	15400	J	17
Mauritanie	Bell	2003	11000	J	17
Mauritanie	Tamourt N'Naaj	2001	6125	J	17
Mauritanie	Tamourt Chlim	2000	4692	J	17
Mauritanie	Tamourt Oumm Lelli	2000	3000	J	17
Mauritanie	Aghor	1996	2100	J	17
Niger	Namga	2004	15371	J	17

Table 2.30 continued: Garganey *Anas querquedula*

Country	Sitename	Year	Count	Type	Ref.
Niger	Gouske	2001	15100	J	17
Niger	Complexe "Tam"	2001	13426	J	17
Niger	Falke	2001	12281	J	17
Niger	Koutoukale	2001	11372	J	17
Niger	Parc Nationale Du "W"	2001	8700	J	17
Niger	Kokoro	1995	7515	J	17
Niger	Gatawani	2001	7420	J	17
Niger	Lac Tchad - Quadrat 16	2003	7100	J	17
Niger	Lassouri	2001	6781	J	17
Niger	Chiya	2000	6650	J	17
Niger	Toumour	2000	6520	J	17
Niger	Bangaga	2001	5311	J	17
Niger	Atchi	2001	4195	J	17
Niger	N'Gagann	2000	3800	J	17
Niger	Mare Mari	2001	3164	J	17
Niger	Mare De Albarkaîze	2004	2910	J	17
Niger	Karandi	1994	2670	J	17
Niger	Tcherassa	1994	2530	J	17
Niger	Agaram (Bagara)	1994	2500	J	17
Niger	Akadaney	2004	1913	J	17
Niger	Complexe Des Retraits Du Lac Tchad	2001	1814	J	17
Niger	Balati	1994	1560	J	17
Niger	Mare De Dossey	2000	1500	J	17
Nigeria	Hadejia-Nguru, All Quadrats	1998	147563	J	17
Nigeria	Lac Tchad - Quadrat 28	1999	15480	J	17
Nigeria	Hadejia-Nguru Wetland, Quad 13	1990	15111	J	17
Nigeria	Lac Tchad - Quadrat 51	1999	7748	J	17
Nigeria	Hadejia-Nguru Wetland, Quad 4	1990	2100	J	17
Nigeria	Hadejia-Nguru Wetland, Quad 7	1990	1545	J	17
Russia	West Siberia		30000	B	8
Russia	Penza Region		10000	B	9
Russia	Kyzlyar Bay		4000	J	17
Senegal	Parc National Des Oiseaux Du Djoudj	2000	288053	J	17
Senegal	Les Trois Marigots	1998	31500	J	17
Senegal	Zic De Djeuss Et Environs (Total)	1994	8548	J	17
Senegal	Ndiael	2000	5000	J	17
Senegal	Boundoum Kassak	2004	4600	J	17
Senegal	Lagunes De St Louis: Pn De Guembeul	2004	4600	J	17
Senegal	Lagunes De St.Louis (Total)	2002	1610	J	17
Sudan	Bagga Sites	2003	10000	J	17
Sudan	Taror Ibrahim	1997	8750	J	17
Sudan	Rodha	1997	5250	J	17
Sudan	Gulli	1997	2800	J	17
Sudan	Himry	1997	1700	J	17
Tchad	Lac Fitri	1999	97332	J	17
Tchad	Lac Tchad - Quadrat 71	2003	59410	J	17
Tchad	Bas Chari (Tchad)	1999	31820	J	17
Tchad	Lac Tchad - Quadrat 17	2003	29040	J	17
Tchad	Valle Du Logone	2003	21200	J	17
Tchad	Lac Tchad - Quadrat 60	2003	8800	J	17

Table 2.30 continued: Garganey *Anas querquedula*

Country	Sitename	Year	Count	Type	Ref.
Tchad	Plaines Du Logone (Tchad)	1999	6101	J	17
Tchad	Fatata	2001	4083	J	17
Tchad	Lac Tchad - Quadrat 24	2003	3820	J	17
Tchad	Lac Tchad - Quadrat 81	2003	2005	J	17
Turkmenistan	Tedzhen (Tejen) Reservoirs 1 + 2	2004	2500	J	17

2.17.2 Garganey movements

This species breeds in Palearctic, from west Europe to eastern Asia mainly between 42°N and 65°N. It is highly migratory with main wintering areas across tropical Africa south of the Sahara, in India and in southern Asia. In Africa, it winters along a line of approximately 10-15°N from Senegal to Chad, with smaller numbers found in eastern Africa. Particular concentrations are found in the Senegal and Niger deltas.

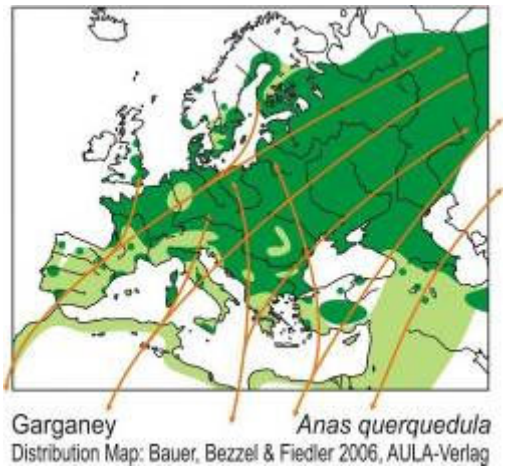


Figure 2.36 Map depicting the movements of Garganey (*Anas querquedula*) based on published information and ring recoveries in the EURING Data Bank

Apart from a few sites in Russia, Garganey are localised and sparsely distributed in the breeding season and have been ringed only in small numbers in most countries in Europe. The largest numbers of recoveries are from ringing carried out in Russia and the Netherlands. Most of the recoveries during winter have been reported in southern Europe, in Italy and in the Balkan region. A smaller number of recoveries has also been reported from south of the Sahara, mainly in Senegal and Mali. The number of Garganey wintering in Europe is small and it is likely that the chance of receiving recoveries from those that stay in Europe is much higher than from those that migrate to south of the Sahara, hence the apparent mismatch in the number of recoveries versus numbers of wintering birds. Mediterranean crossing is evident from the increase in recoveries in Italy between January and February; this country, together with the Balkans and Greece, is involved in strong return movements in March and, to a lesser extent, in April, when no more recoveries are reported from the African winter quarters. The return migration continues into southern Russia and Kazakhstan in April and further north in May. Recoveries from the breeding season are spread out from west Europe to Siberia at about 90°E.

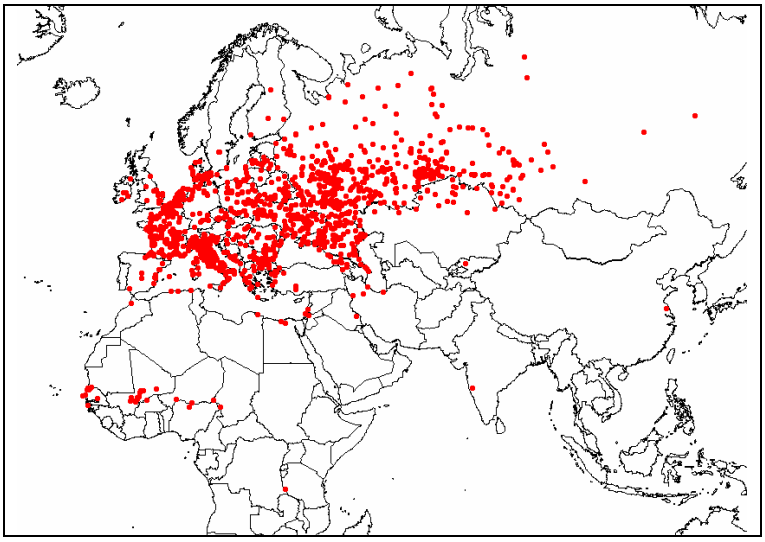
Autumn migration starts in August and some Garganey are still reported in Russia in October. Birds breeding in western and northern Europe use two main routes; they either pass the Iberian Peninsula or the central Mediterranean on their way to West Africa via Morocco or Algeria. Eastern European birds pass through the eastern Mediterranean to East Africa. Siberian birds also pass eastern Mediterranean and southwest Asia on their way to East Africa, reaching as far west as Chad, but some move also through eastern Iran to Pakistan, India and Sri Lanka. Return migration from both West and East Africa is concentrated in the central Mediterranean. This apparent loop migration is supported by the large number of recoveries reported in Italy between February and April.

Table 2.31: Summary of the movements of Garganey (*Anas querquedula*) from the literature based on published information and ring recoveries in the EURING Data Bank.

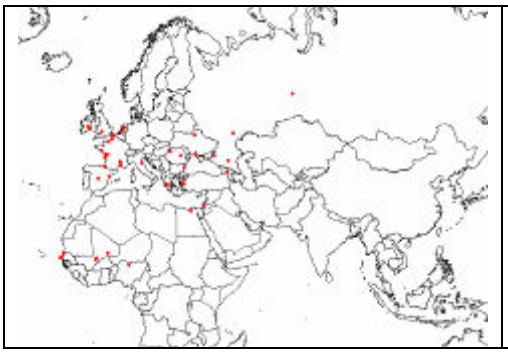
Garganey ***Anas querquedula***

Distribution: Palaearctic, across Europe and Asia, mostly between 42°N and 65°N. No biogeographical populations defined in Western Eurasia. Two main migration routes: one from Central Europe through the Mediterranean and one via Spain along Atlantic coast. In winter, two groups, one wintering in East Africa (through SW-Asia), and one in West Africa. Pair formation takes place in winter and males often follow females to her breeding grounds

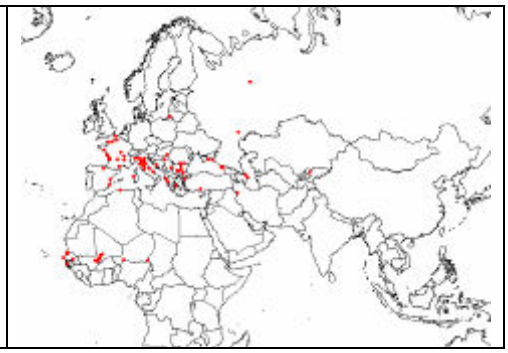
Population (or part of population)	Autumn Migration		Wintering / Non-breeding Grounds		Spring Migration		References
	direction / via	during	location	during	direction / via	during	
Western Siberia (a)	through eastern Mediterranean, Italy, S/SW across Red Sea and off north Sinai		West/Central Africa as far as Chad				3, 8, 10, 11, 12
Western Siberia (b)	SW-Asia, Eritrea, Ethiopia, some through eastern Iran to Pakistan, India & Sri Lanka		East Africa, Pakistan, India, Sri Lanka				1, 3, 8, 11
Europe West of Urals	via Spain and Italy, France	July-Oct	South of Sahara	loop migration	via central Mediterranean, former Yugoslavia, Greece	Feb-Apr	1, 6, 7, 8, 12
							8
NE-Europe, Belgium, Denmark, Great Britain, Netherlands, France, W-Germany	S through Central Europe; SE via Black Sea region across Sahara to West Africa		few stay in Great Britain, Netherlands, Belgium, Germany, Hungary, Black Sea region, Mediterranean region, to Morocco and Algeria. Most winter in West Africa				1, 3, 5, 6, 7
Western Europe (France) as far as Western Siberia (Tobol and Irtysh to Yenisey River	WSW, passage Sea of Azov, Middle Ob, Netherlands, N-Italy, via Spain and Italy, Atlantic coast		Senegal Delta, Mali				2, 7, 8, 12
Greece, Latvia, Poland, Russia, Kazakhstan, India	W, via Black Sea region, Israel, massive autumn passage along north coast of Sinai, Egypt		Nigeria				5, 8, 10
Hungary	E, through E-Mediterranean		Egypt, as far as East Africa				1



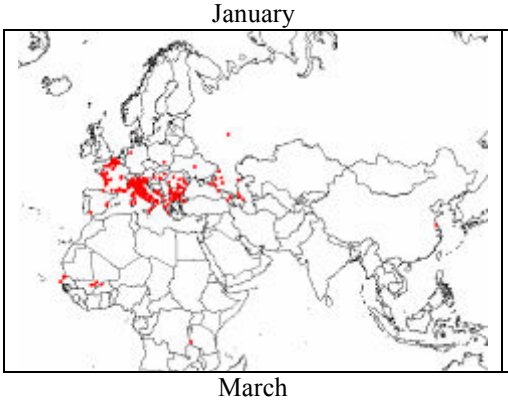
Finding locations of all dead birds



January



February



March

April

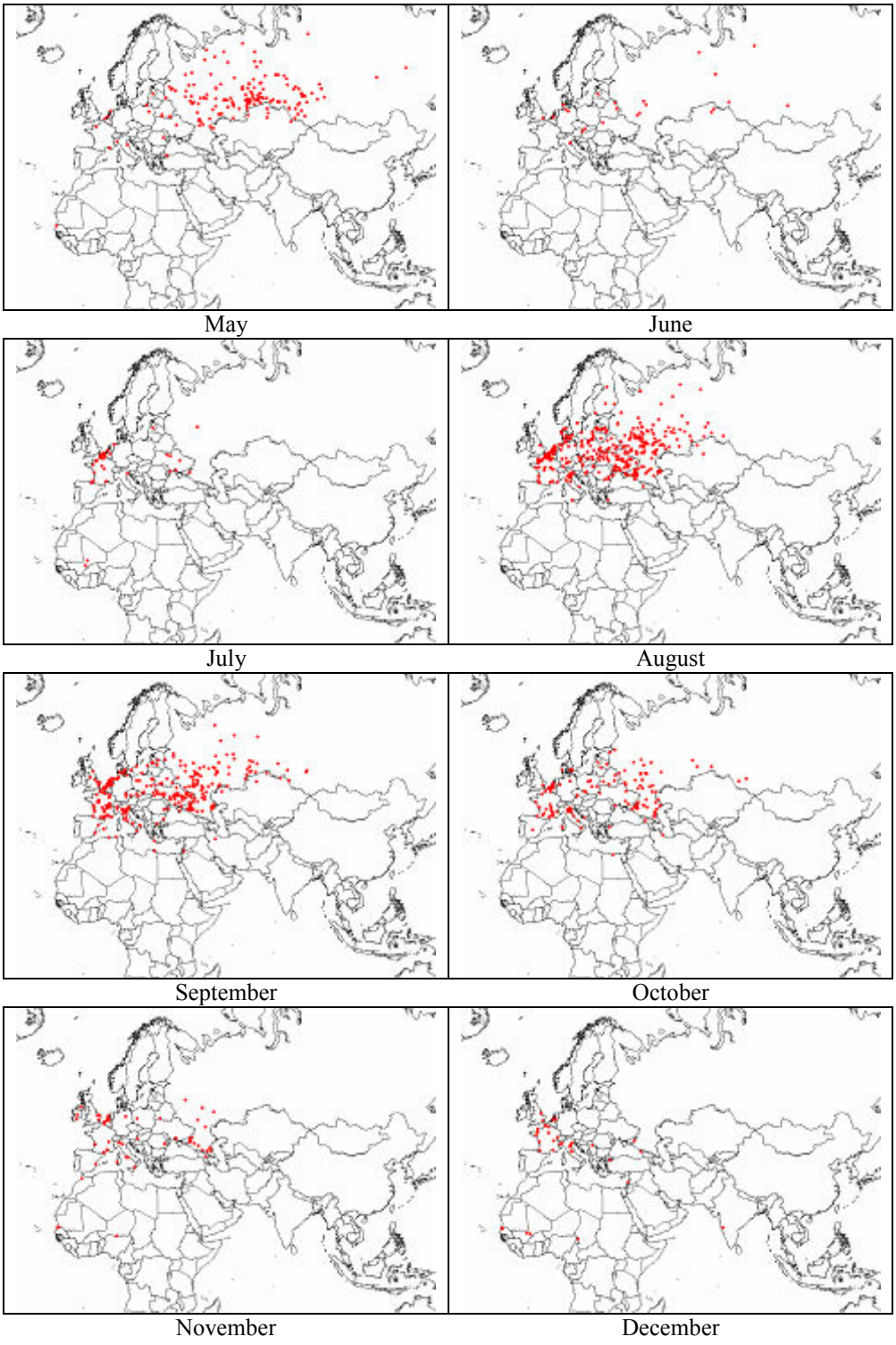


Figure 2.37: Finding locations of all dead Garganey (*Anas querquedula*) in the EURING data bank. All birds are presented and also broken down by month.

2.18 Northern Shoveler (*Anas clypeata*)

2.18.1 Numbers and distribution

The most important January concentrations of key sites for Northern Shoveler are in the Mediterranean and south Caspian regions and Iran, and the species is a significant trans-Saharan migrant. (Figure 2.38). In the Mediterranean region, Spain is the most important country for this species, and there are also large numbers of key sites in, Portugal, Morocco, Algeria and Tunisia, and in the East Mediterranean, in Albania, Greece, Egypt, Israel and Jordan. In the Caspian region, Azerbaijan and Iran are the most important countries. Birds spending the northern winter in Subsaharan Africa concentrate in East Africa in Sudan, Ethiopia and Kenya, and in the west African Sahel zone in Senegal, Mauritania, Niger, Nigeria and Chad.

The highest January count of Northern Shoveler, 41,000 birds, was made at Gyzylagach Nature Reserve, Azerbaijan (Table 2.32). Six sites in Spain recorded January counts between 28,752 and 36,855: Embalse de Sierra Brava in 2003, Doñana National Park in 1991, Lucio de los Ansares in 1992, Lucios De Beta La Palma-Isla Mayor (2003), Marisma de Hinojos (2001) and Parque Natural De La Albufera (1991). More than 10,000 birds were counted at six further sites in Spain. In France, two sites have recorded five-figure peak counts, The Camargue in 2004 with 19,176, and Lac de Grandlieu in 2001 with 12,950. In the East Mediterranean region, 27,070 were counted at the Amvrakikos Wetlands (Greece) in 1996, and 17,410 at the Karavasta Complex, Albania in 2000. In Egypt, counts of 15,427 at Lake Burullus and 12,097 at Lake Manzala were peak counts in 1990. Elsewhere in North Africa, 10,960 at Merza Zerga (Morocco) in 1991 and 10,000 at Sebkha Kelbia (Tunisia) in 1995 are the highest peak counts. In Iran, Bakhtegan Lake recorded a count of 25,689 in 1997 and Gomishan Marsh 23,155 in 2003. In Subsaharan Africa, the highest peak count of 22,260 was made at Lake Abijatta, Ethiopia in January 1994. A count of 19,800 was made at the Djoudj National Park, Senegal in 1998, and 17,095 at Diawling, Mauritania in 2004.

Table 2.32: Nothern Shoveler *Anas clypeata*: Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 2,000 or more have been recorded.

Country	Sitename	Year	Count	Type	Ref.
Albania	Karavasta Complex	2000	17410	J	17
Algeria	Sebkhet Djendli	1992	9000	J	17
Algeria	Lac Tonga	1995	8865	J	17
Algeria	Marais De Mekhada	1998	7025	J	17
Algeria	Lac Des Oiseaux	1990	6688	J	17
Algeria	Lac Oubeira	1992	2850	J	17
Algeria	Grande Sebkha D'Oran	1997	2170	J	17
Azerbaijan	Caspian Coast: Gyzylagach Nature Reserve		41000	J	17
Azerbaijan	Big Kyzyl-Agach Bay	1996	35188	J	17
Azerbaijan	Hagygabul Gyolu (Hadgegabol Lake)	1996	9480	J	17
Azerbaijan	Sarysu Lake (Sarasuy)		8745	J	17
Azerbaijan	Mahmudchala Lake		7777	J	17
Azerbaijan	Lake Aggyol		5800	J	17
Azerbaijan	Kirov Bay	1991	3060	J	17
Bulgaria	Burgas Lake (Vaya)	1992	3920	J	17

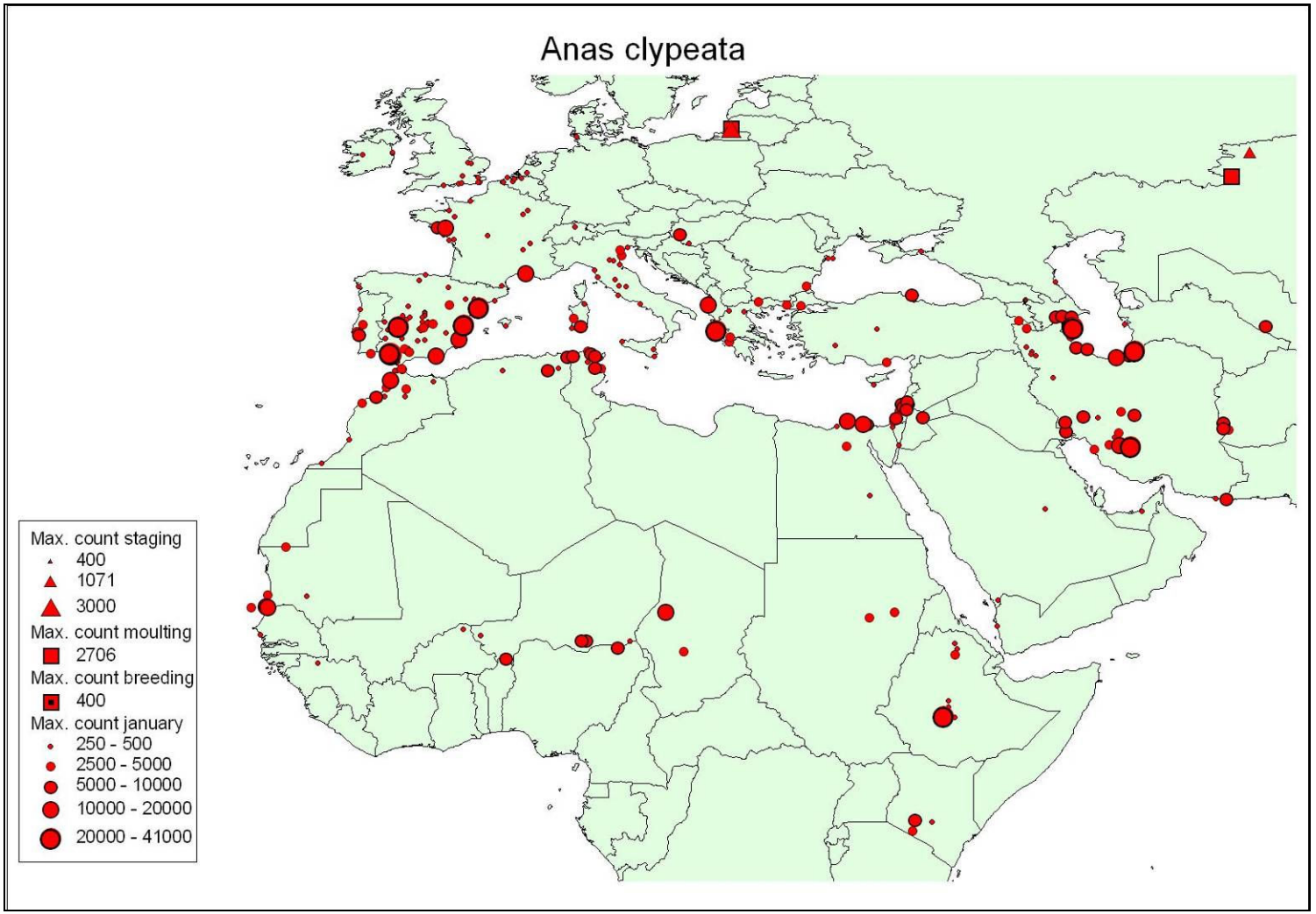


Figure 2.38: Northern Shoveler *Anas clypeataa*: Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 250 or more have been recorded.

Table 2.32 continued: Nothern Shoveler *Anas clypeata*

Country	Sitename	Year	Count	Type	Ref.
Egypt	Lake Burullus	1990	15427	J	17
Egypt	Lake Manzala	1990	12097	J	17
Egypt	El Malaha. Bur Fuad	1990	8200	J	17
Egypt	Lake Qarun	1990	4571	J	17
Egypt	Luxor To Qena	2001	2014	J	17
Ethiopia	Lake Abijatta	1994	22260	J	17
Ethiopia	Ashange Lake (Ashenge)	1995	2540	J	17
Ethiopia	Akaki Reservoir	2000	2385	J	17
Ethiopia	Shesher And Welala Marshes	2004	2302	J	17
Ethiopia	Abijata-Shalla Lakes National Park	2000	2005	J	17
France	La Camargue	2004	19176	J	17
France	Lac De Grandlieu	2001	12950	J	17
France	Presqu'Ile Guérandaise Dont Traicts Du Croisic	2001	5065	J	17
France	Loire Aval	1995	2940	J	17
France	Grand Plan Du Bourg; Dont Complexe Du Vigueirat	2001	2402	J	17
France	Résèrve Naturelle De Moeze (Charente-Seudre)	2001	2096	J	17
France	Etangs D'Orx	1994	2054	J	17
Greece	Amvrakikos Wetlands	1996	27070	J	17
Greece	Messolonghi Lagoon (From River Evinos To River Acheloos)	1995	5000	J	17
Greece	Evros Delta	1999	4600	J	17
Greece	Kerkini	2001	3730	J	17
Greece	Kotychi Lagoon	1994	2750	J	17
Greece	Porto Lagos (Lagos And Coast)	1999	2565	J	17
Greece	Volvi	1999	2173	J	17
Hungary	Kisbalaton `Regi`	2002	7050	J	17
Hungary	Geszt. Begecsi Halastavak	2000	2190	J	17
Hungary	Lake Fertö; (Hungarian Part)	2000	2100	J	17
Iran	Bakhtegan Lake	1997	25689	J	17
Iran	Gomishan Marsh	2003	23155	J	17
Iran	Fereydoon Kenar, Ezbaran & Sorkh Rud Damgahs: Damgah Fereydoon Ke	2003	13230	J	17
Iran	Maharloo Lake	1997	11550	J	17
Iran	Govater Bay & Hur-E-Bahu: Bahookalat River	1997	9560	J	17
Iran	Hamidieh Grassland	1994	8976	J	17
Iran	Hamoun Lakes Complex: Kuh-I-Khajeh	1994	7994	J	17
Iran	Hamoun Lakes Complex: Hamoun-E-Saberi	1997	7885	J	17
Iran	Miankaleh W.R. & Gorgan Bay: Miankaleh Protected Region	1991	7123	J	17
Iran	Miangaran Marshes: Miangaran & Izeh Marshes	1994	6842	J	17
Iran	Amirlayeh & Sheikh Ali Kol: Amirlayeh Lake	2003	6450	J	17
Iran	Anzali Mordab Complex: Anzali Mars West (Main Lagoon)	2003	6300	J	17
Iran	Shadegan Marshes Protected Region: Total	1992	6220	J	17
Iran	Tashk Lake	1994	5875	J	17
Iran	Paein Rud Posht Ab-Bandan	2003	5600	J	17
Iran	Dasht-E-Arjan Marsh	1994	4754	J	17
Iran	Anzali Mordab Complex: Selkeh Protected Region	2003	3940	J	17
Iran	Helleh River: River And Delta	1992	3914	J	17
Iran	Roshandan Ab-Bandan	1990	3500	J	17
Iran	Anzali Mordab Complex: Siakeshim Protected Region	2003	3470	J	17
Iran	Anzali Mordab Complex: Sorkhankel	2003	3000	J	17
Iran	Aras River: Bralan - Aras Dam	1997	3000	J	17

Table 2.32 continued: Nothern Shoveler *Anas clypeata*

Country	Sitename	Year	Count	Type	Ref.
Iran	Gavekhoni Marsh	1990	2874	J	17
Iran	Chah Nimeh Lake	1995	2850	J	17
Iran	Lavandavil Wildlife Refuge: Lavandavil Marsh	2003	2755	J	17
Iran	Kaftar Lake	1993	2700	J	17
Iran	Anzali Mordab Complex: Anzali Marsh East	1992	2625	J	17
Iran	Gharaso (Boralan) Marsh	1994	2500	J	17
Iran	Miankaleh W.R. & Gorgan Bay: Lapoo - Zaghmarz Ab-Bandan	2003	2000	J	17
Israel	North Lower Jordan Valley	2001	9490	J	17
Israel	Hula Valley	1991	8721	J	17
Israel	Valley Of Yesreel	1996	6850	J	17
Israel	Galilee Coastal Plain	1990	5989	J	17
Israel	Southern Coastal Plain	1999	5295	J	17
Israel	Central Coastal Plain	2001	2987	J	17
Israel	Foothills Of Judea	2000	2091	J	17
Italy	Quartu	1994	8780	J	17
Italy	Laguna Di Venezia	2000	4488	J	17
Italy	Delta Del Po - Parte Veneta	2002	3841	J	17
Italy	Oristano	1998	3546	J	17
Jordan	Azraq Mudflat (Qa Azraq)	2001	6500	J	17
Kazakhstan	Kulykol-Taldykol Lake System	2000	2706	J	17
Kenya	Lake Oloidien, Oloidien Bay	1996	5161	J	17
Kenya	Nakuru Sewage Works	2004	3190	J	17
Kenya	Lake Naivasha	1997	3000	J	17
Kenya	Dandora Oxidation Ponds	1996	2256	J	17
Kenya	Manguo Floodplain	2000	2024	J	17
Mauritanie	Diawling	2004	17095	J	17
Mauritanie	Bell	2003	4162	J	17
Mauritanie	Chatt Boul	2001	3800	J	17
Mauritanie	Rosso, Cuvettes Du Gadianguer	1994	3200	J	17
Mauritanie	Trarza, Aftout Es Saheli	2004	2866	J	17
Morocco	Merja Zerga: Kenitra	1991	10960	J	17
Morocco	Barrage Al Massira: Settat	1994	7640	J	17
Morocco	Baie De Jorf Lasfar	1995	4300	J	17
Morocco	Restinga (Oued) Smir; Tetouan	1991	4251	J	17
Morocco	Merja De Douy Et: Fes	1993	3611	J	17
Morocco	Barrage De Smir	1994	3230	J	17
Morocco	Merja De Sidi Bou Ghaba = Mehdia: Kenitra	1995	2968	J	17
Morocco	Merja Oulad Skher	1992	2377	J	17
Morocco	Barrage D'El Kansera: Khemisset	1993	2342	J	17
Morocco	Lagune De Sidi Moussa-Oualidia: El Jadida	1994	2255	J	17
Morocco	Merja Des Oulad- Khalouf=Briech: Tanger	1990	2000	J	17
Niger	Complexe Des Retraits Du Lac Tchad	2001	11300	J	17
Niger	Falke (Taouna)	2001	9620	J	17
Niger	Chiya	1999	9000	J	17
Niger	Complexe "Tam"	2001	7900	J	17
Niger	Gouske	2001	6025	J	17
Portugal	Estuário Do Sado	1999	9350	J	17
Portugal	Estuário Do Tejo	1997	4770	J	17
Portugal	Ria De Faro	1997	3090	J	17

Table 2.32 continued: Nothern Shoveler *Anas clypeata*

Country	Sitename	Year	Count	Type	Ref.
Portugal	Paul Do Boquilobo	1991	2900	J	17
Portugal	Quinta Do Taipal	1993	2160	J	17
Russia	Neman River delta		3000	J	17
Saudi Arabia	Jubayl Lagoons = Sabkhat Al Fasl	1996	2195	J	17
Senegal	Parc National Des Oiseaux Du Djoudj	1998	19800	J	17
Senegal	Zic De Djeuss Et Environs (Total)	1993	2510	J	17
Spain	Embalse De Sierra Brava	2003	36855	J	17
Spain	Parque Nacional De Doñana (Consolidation)	1991	36570	J	17
Spain	Lucio De Los Ansares (Se)	1992	32500	J	17
Spain	Lucios De Beta La Palma-Isla Mayor (Se)	2003	30844	J	17
Spain	Marisma De Hinojos (H)	2001	29600	J	17
Spain	Parque Natural De La Albufera (V)	1991	28752	J	17
Spain	Lucio De Marilópez Grande (Se)	1991	22500	J	17
Spain	Delta Del Ebro (T)	1994	20617	J	17
Spain	Caño Travieso (Se)	1997	15665	J	17
Spain	Parque Natural De El Hondo (A)	1999	13568	J	17
Spain	De La Algaida A Hato Villa (H)	1998	11100	J	17
Spain	Lucios De Veta Lengua Y Aguas Rubias (H)	1992	10800	J	17
Spain	Del Palacio A La Algaida (H)	2001	9711	J	17
Spain	Caño Del Guadiamar Pnd (H)	1992	8500	J	17
Spain	Lucio Del Membrillo (H)	1992	8500	J	17
Spain	Laguna De Fuente De Piedra (Ma)	1998	4640	J	17
Spain	Laguna De Manjavacas (Cu)	1998	4368	J	17
Spain	Los Pobres. Lucios De Beta La Plama (Consolidated)	1991	4300	J	17
Spain	De Aguas Rubias Al Lucio Del Hondón (H)	1997	4050	J	17
Spain	Laguna De Gallocanta (Z)	1990	3509	J	17
Spain	Tablas De Daimiel (Cr)	1998	3250	J	17
Spain	Regadíos De Vegas Altas	1991	3216	J	17
Spain	Marismas Del Rocío (H)	1991	3000	J	17
Spain	Laguna Calderón Grande (Se)	1998	2676	J	17
Spain	Laguna De Medina (Ca)	1993	2649	J	17
Spain	Laguna De La Mata (A)	1995	2500	J	17
Spain	Lucios Al Sur De De Los Ansares (Se)	1990	2500	J	17
Spain	Regadíos De Palazuelos	1993	2399	J	17
Spain	Del Puntal Al Palacio De Doñana (H)	2000	2350	J	17
Spain	Lucios Del Caballero Y Del Puntal (H)	1992	2300	J	17
Spain	Embalse De Valdecañas	1993	2270	J	17
Spain	Cañada De Las Norias (Al)	2003	2172	J	17
Spain	Lucio De Marilópez Chico (Se)	1996	2100	J	17
Sudan	Bagga Sites	2003	3330	J	17
Sudan	Green Belt Sewage Ponds	1997	2800	J	17
Sudan	Am Shugara	2004	2100	J	17
Tchad	Lac Fitri	2003	3165	J	17
Tunisia	Sebkha Kelbia	1995	10000	J	17
Tunisia	Lac De Tunis	1990	8112	J	17
Tunisia	Garaet Mabtouha	1991	5880	J	17
Tunisia	Lac Ichkeul	1992	3920	J	17
Tunisia	Sebkha Et Saline De Monastir	1992	3100	J	17
Tunisia	Sebkha De Sejoumi	1995	3000	J	17

Table 2.32 continued: Nothern Shoveler *Anas clypeata*

Country	Sitename	Year	Count	Type	Ref.
Tunisia	Sebkha De Metbasseta	1993	2500	J	17
Turkey	Kizilirmak East (Balik)	1999	5930	J	17
Turkey	Kizilirmak (Karabogaz+Balik)	1993	4564	J	17
Turkey	Goksu Delta (Silifke)	1992	4325	J	17
Turkmenistan	Caspian Coast: Gasankuli-Guyjuk	1991	2200	J	17
United Kingdom	Somerset Levels	2003	2190	J	17
Uzbekistan	Zekry Lake	2004	5605	J	17

2.18.2 Northern Shoveler movements

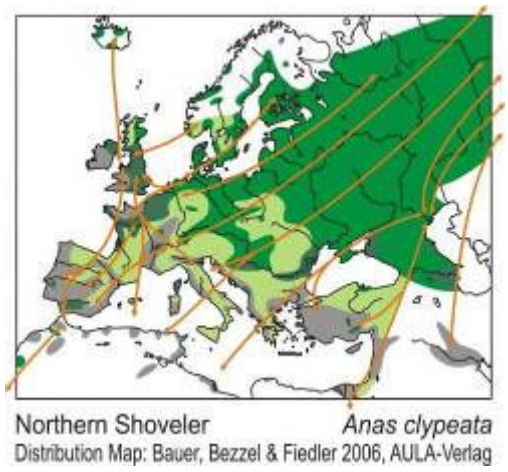


Figure 2.39: Map depicting the movements of Northern Shoveler (*Anas clypeata*) based on published information and ring recoveries in the EURING Data Bank.

Shoveler breed across a wide geographic region that includes both northwestern North America and a large area in northern Eurasia south to about 40°N in some areas. Wintering areas spread out in western and southern Europe, southern Asia eastwards to Japan. The Shoveler is regularly found during winter in areas south of the Sahara along a line of approximately 12°N, from Senegal in the west to Sudan in the east and then south along the rift valley to Kenya.

In Europe, the largest concentrations tend to occur in the southern countries of Spain and France and eastwards into Turkey and Greece. Further concentrations occur around the Caspian Sea and in southern Iran.

The largest numbers of recoveries are from birds ringed in Russia, the Netherlands and Britain. Recoveries between December and February are mainly found in western and south-western Europe and in northwest Africa. Single recoveries are also reported eastwards to the area of Caspian Sea. Several recoveries are also found in Senegal in West Africa. A tendency to decrease in the number of recoveries from Iberia and Italy is recorded between January and February, while the intensity of return movements increases in March, with a further decrease in Iberia and strong influxes of migrants in Italy. In April, recoveries are spread out in southern Russia and Kazakhstan, while birds are reported from areas further north in May. Concentrations of recoveries in coastal areas in western Europe in July tend to be moulting males. The autumn migration starts early and many birds start moving west in August and concentrations are found along the Atlantic coast between September and November. A small number of recoveries in Italy during autumn supports the idea that the species performs a loop migration.

Shovelers breeding in northern Europe and northwestern Russia move SW to western and southwestern Europe, North Africa as well as to tropical West Africa. Birds from Britain & Ireland move south to France and Spain, while birds from breeding areas in central and eastern Europe move to western Europe and the Mediterranean basin. From Russia, Siberia and Kazakhstan birds move either to Mediterranean, southwest Asia and East Africa or to the Caspian area and further south to Pakistan and India. Males perform moult migration during summer and gather in some localities in Europe and Russia, e.g. IJsselmeer, Matsalu Bay and Volga delta. Typical for many duck species is that pair formation takes place in winter and males often follow females to the breeding site.

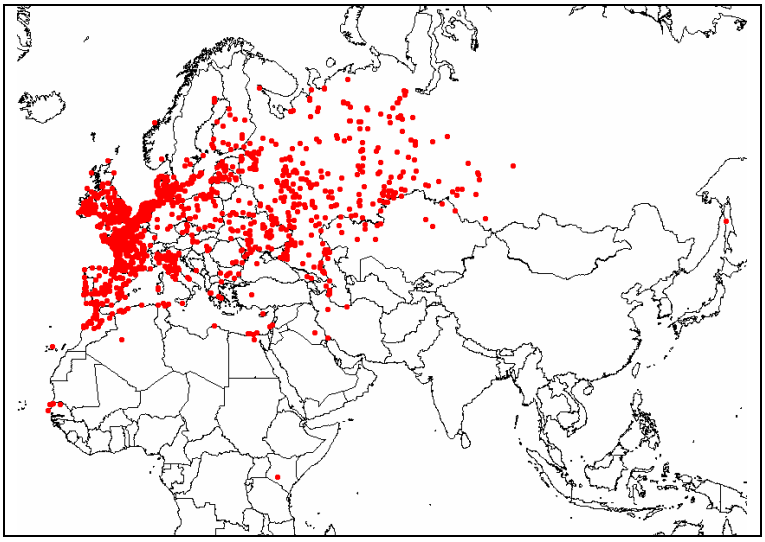
Table 2.33: Summary of the movements of Northern Shoveler (*Anas clypeata*) from the literature based on published information and ring recoveries in the EURING Data Bank.

Shoveler ***Anas clypeata***

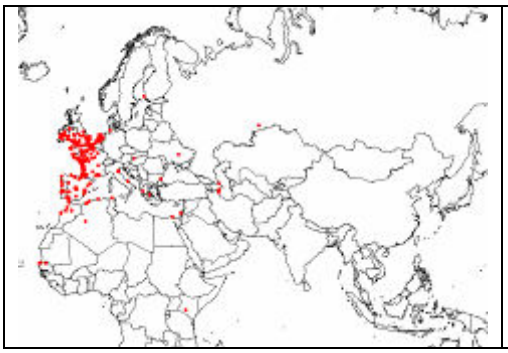
Distribution: Holarctic, across North America and northern Eurasia, breeding as far south as Mediterranean

Moult: moult migration from June onwards (The Baltics, Netherlands, Volga delta)

Population (or part of population)	Autumn Migration		Wintering / Non-breeding Grounds		Spring Migration		References
	direction / via	during	location	during	direction / via	during	
Iceland (10-30 breeding pairs)			N-Britain and Ireland				3
Fennoscandia, the Baltics, Russia	via Denmark, Germany	Aug-Sep	NW-Europe, Netherlands, Great Britain & Ireland, as far as France and Spain, Italy, Mediterranean basin (mix with western birds here)			Feb-Mar	1, 2, 3, 5, 6, 8
Great Britain & Ireland	S		S-France, S-Spain, Italy, Mediterranean, N-Africa				1, 3
Central and Southwest Europe	S-SW, birds to Africa tend to use a southwestern route across the Iberian Peninsula	Sep-Oct	Mediterranean basin (mix with eastern birds here), NW- Africa, Senegal, Niger, Chad, Nigeria	Oct-Jan	via Italy (loop migration)	Mar-Apr	1, 3, 5, 7, 8, 12
W-Siberia, Russia	moult in Volga delta, Egypt	June	SW-Asia, NE- and E-Africa	Oct-Jan			1, 8
SW-Siberia	moult within SW-Siberia, in Kazakhstan, in North Caspian region, basin of Ob and Irtysh	W-SW	as far as Caspian region, India, Pakistan, Morocco, Egypt				8, 11, 14
Iran			India				8
North America			Mexico, California, Central America, West Indies				3

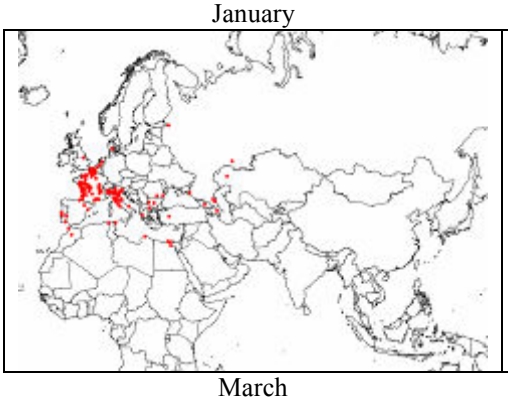


Finding locations of all dead birds

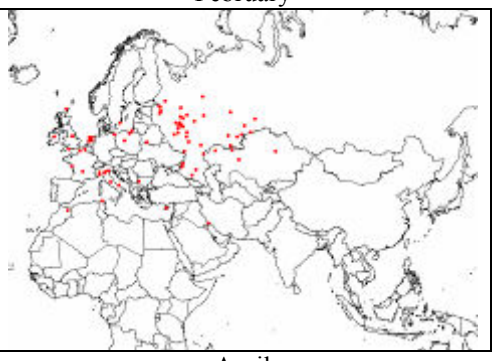


January

February



March



April

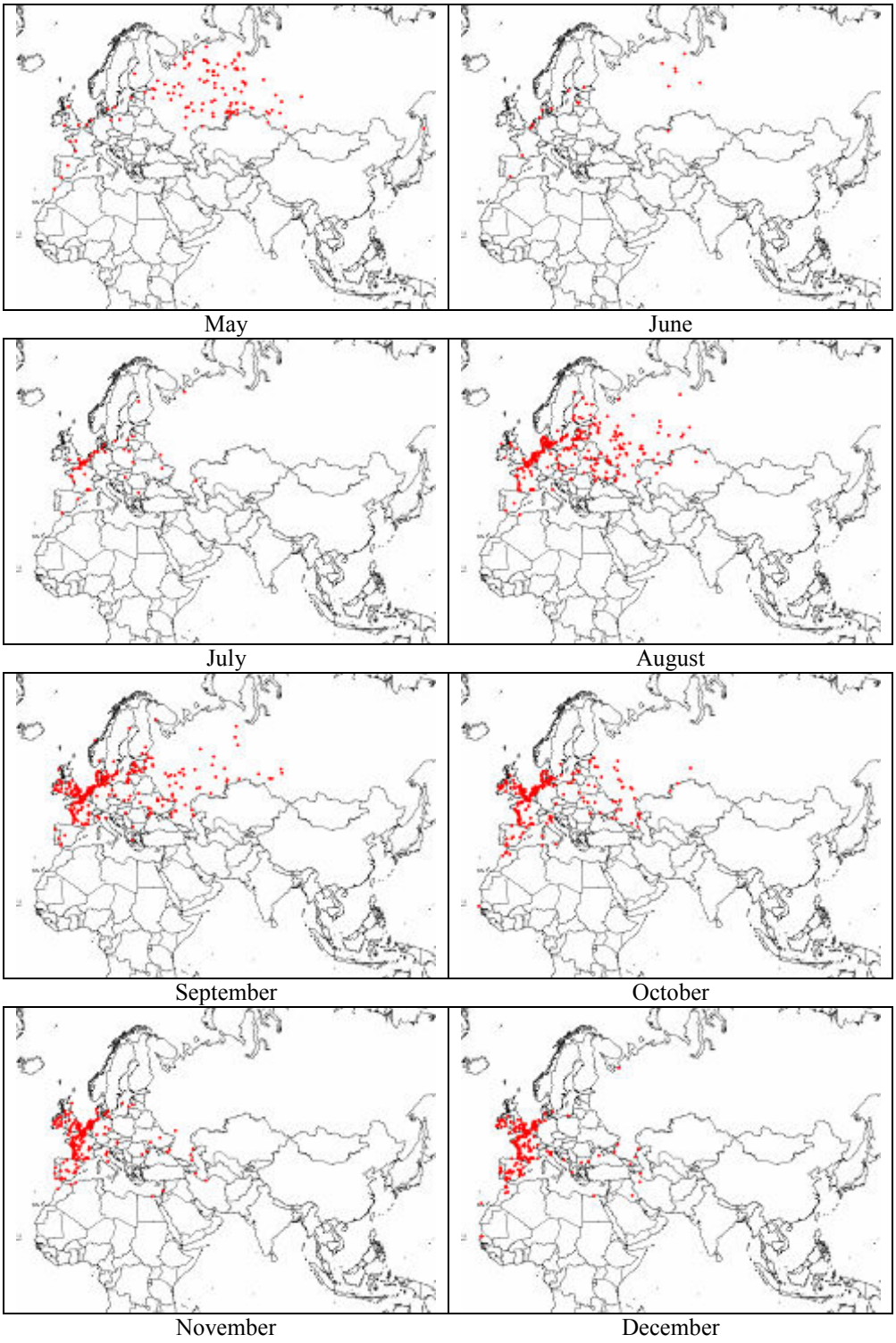


Figure 2.40: Finding locations of all dead Northern Shoveler (*Anas clypeata*) in the EURING data bank. All birds are presented and also broken down by month.

2.19 Red-crested Pochard (*Netta rufina*)

2.19.1 Numbers and distribution

Numbers of Red-crested Pochard are highest in the Caspian region and Central Asia. Further west there are relatively small numbers distributed in Iberia and soutern France, in lakes north of The Alps, and from the Balkans to Turkey and the northern Black Sea (Figure 2.41). Important breeding and staging sites have been identified in the northern Caspian region of Russia and Kazakhstan, and the most important wintering concentrations have been counted in Azerbaijan, Iran, Turkmenistan, Uzbekistan and Kyrgyzstan. In Europe, the Swiss Lakes, and the Bodensee, which extends into Germany and Austria, hold the highest numbers, and a shift in population to this region in the 1990s from Spain and France has been well documented (Keller 2005). In southeast Europe, The Sivash, Ukraine and Lake Ohrid on the borders of Greece, Albania and Macedonia are the most important sites, and a number of the Turkish lakes also hold important concentrations.

Table 2.34 shows that two outstandingly important sites for Red-Crested Pochard in January are Gyzylagach nature Reserve, Azerbaijan, where a peak count of 188,000 has been recorded, and the Volga Delta, Russia, where the peak count was 120,000. The highest concentration of key sites for this species is in Turkmenistan, where counts exceeding 4,000, and up to 67,900, have been made at 18 sites. Four sites in Uzbekistan and four in Azerbaijan also reached these levels, and at Issyk Kul in Kyrgyzstan, 30,677 were counted in 1999. In Europe, the highest counts in recent years have been at The Bodensee in Switzerland-Germany-Austria, where 12,204 were counted in 1999. Other lakes in Switzerland are increasingly important, and 11,766 were counted at Vierwaldstattersee in 2000, 9,730 at Lake Neuchâtel in 2001 and 4,067 at Lac Léman in 2002. Further east in Europe, 7,000 were counted at Lake Ohrid in Macedonia-Albania-Greece in 1990, and 10,000 in the eastern Sivash in 2000. The most important sites in the West Mediterranean in January are the Ebro delta, Spain, where 8,375 were counted in 1999, and Parque Natural De La Albufera where there were 8,360 in 1991. The Camargue, France, is also important, and 4,000 were counted there in 1991.

Table 2.34: Red-crested Pochard *Netta rufina*: Peak counts between 1990 and 2005 at the 100 sites in Europe, Africa and Central Asia where 500 or more have been recorded.

Country	Sitename	Year	Count	Type	Ref.
Albania	Lake Ohrid (Albanian Part)	1996	1405	J	17
Armenia	Lake Sevan		1337	J	17
Armenia	Sevan National Park/Lake Sevan	2003	1337	J	17
Azerbaijan	Caspian Coast: Gyzylagach Nature Reserve		188000	J	17
Azerbaijan	Sarysu Lake (Sarasuy)		42647	J	17
Azerbaijan	Caspian Coast: Factory Shelf		15218	J	17
Azerbaijan	Kura River Estuary		13871	J	17
Azerbaijan	Kirov Bay	1991	2600	J	17
Azerbaijan	Mahmud-Chala Lake (Third Chala)	1996	1750	J	17
Azerbaijan	Caspian Coast: Yashma Is. and Gilazy Spit		567	J	17
France	La Camargue	1991	4000	J	17
Germany/ Switzerland/Austria	Bodensee Gesamt	1999	12204	J	17
Iran	Gomishan Marsh	1995	3280	J	17

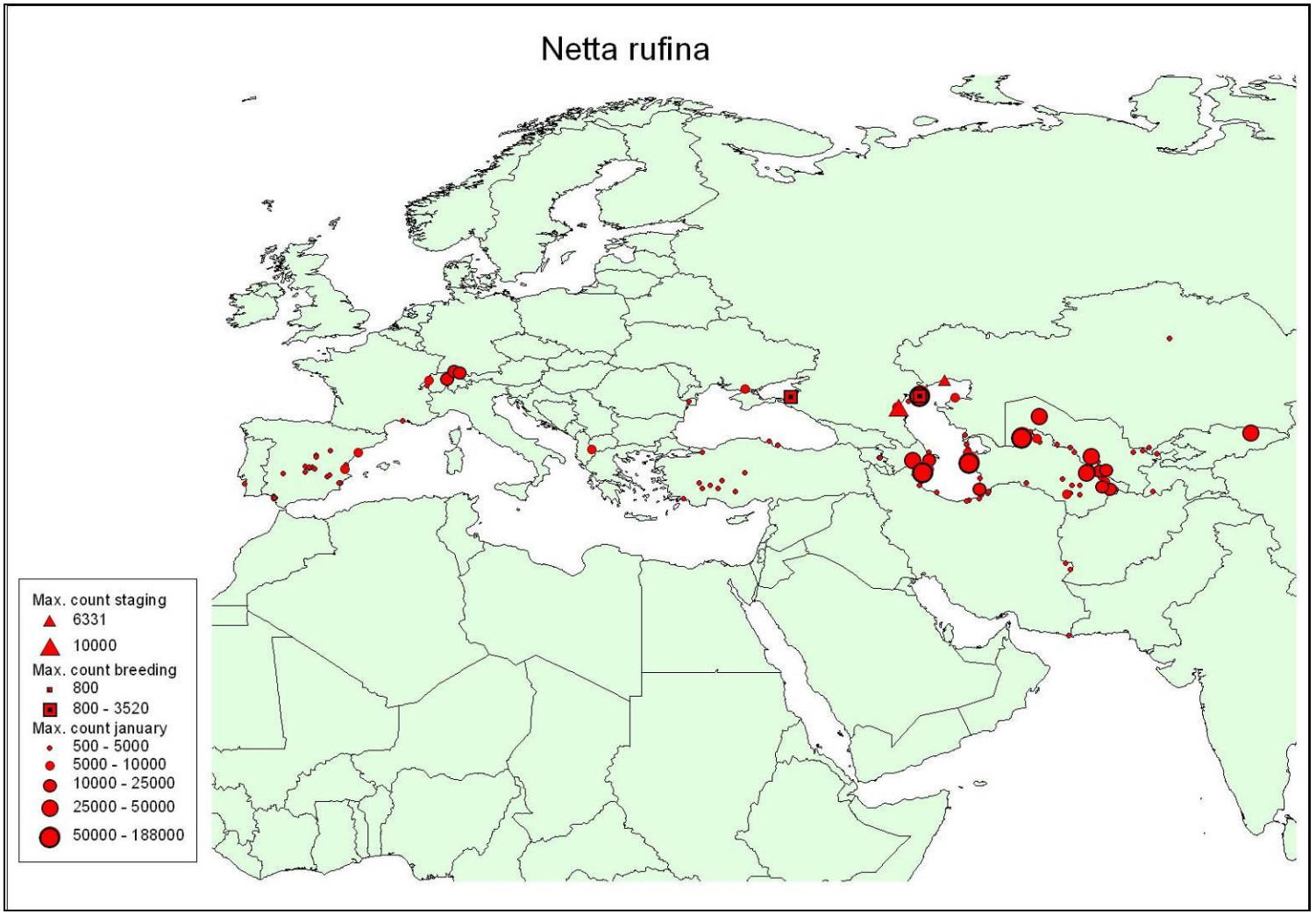


Figure 2.41: Red-crested Pochard *Netta rufina*: Peak counts between 1990 and 2005 at sites in Europe, West and Central Asia where 500 or more have been recorded.

Table 2.34 continued: Red-crested Pochard *Netta rufina*

Country	Sitename	Year	Count	Type	Ref.
Iran	Miankaleh W.R. & Gorgan Bay: Lapoo - Zaghmarz Ab-Bandan	2003	1605	J	17
Iran	Amirlayeh & Sheikh Ali Kol: Amirlayeh Lake	1990	1230	J	17
Iran	Govater Bay & Hur-E-Bahu: Bahookalat River	1994	963	J	17
Iran	Hamoun Lakes Complex: Hamoun-E-Saberi	1993	902	J	17
Iran	Caspian Coast (Gilan): Anzali- Astara	1990	850	J	17
Iran	Chah Nimeh Lake	1995	795	J	17
Iran	Ala Gol Marshes: Ulma Gol	1998	777	J	17
Iran	Roshandan Ab-Bandan	1990	660	J	17
Iran	Miankaleh W.R. & Gorgan Bay: Gorgan Bay	1991	595	J	17
Iran	Ala Gol Marshes: Ala Gol	1998	550	J	17
Iran	Sayed Mahali & Zarinkola Ab: Zarinkola Ab-Bandan	1998	500	J	17
Kazakhstan	Caspian Coast. O-Va Durneva-Turmenia Border (300Km	1991	10000	J	17
Kazakhstan	Chardara Vdchr	2004	4776	J	17
Kazakhstan	Karakol Lake	1991	3000	J	17
Kazakhstan	Kurgaldjinskyi Reserve	1995	1974	J	17
Kazakhstan	North Caspian Coast total	2002	6331	S	13
Kyrgyzstan	Issyk-Kul Lake: Total	1999	30677	J	17
Macedonia	Lake Ohrid-Macedonian Part	1990	7000	J	17
Portugal	Lagoa De Santo André	1994	619	J	17
Romania	Furtuna	1998	1050	J	17
Russia	Volga Delta		3520	B	31
Russia	Kuban Delta		3000	B	12
Russia	Volga Delta		120000	J	31
Russia	Caspian Sea: Kizliar Bay		8000	J	17
Russia	Caspian NW Coast	1991	3000	J	17
Russia	Primorsko-Akhtarskaya Lake System		680	J	17
Russia	Kyzlyar Bay		10000	S	7
Spain	Delta Del Ebro (T)	1999	8375	J	17
Spain	Parque Natural De La Albufera (V)	1991	8360	J	17
Spain	Laguna Del Taray. Quero (To)	1997	3946	J	17
Spain	Lucio De Los Ansares (Se)	2003	3325	J	17
Spain	Lucio Del Membrillo (H)	2003	2495	J	17
Spain	Laguna De Pétrola (Ab)	1999	2328	J	17
Spain	Marjal De Almenara (Cs)	1995	2200	J	17
Spain	Laguna De Gallocanta (Z)	1990	1510	J	17
Spain	Lucios De Beta La Palma-Isla Mayor (Se)	2001	1320	J	17
Spain	Embalse De Orellana	1995	1289	J	17
Spain	Lucios Al Sur De De Los Ansares (Se)	1990	1200	J	17
Spain	Embalse De Buendía (Cu)	2001	1192	J	17
Spain	Tablas De Daimiel (Cr)	1998	1150	J	17
Spain	Laguna Del Taray Chico	1993	1080	J	17
Spain	Marisma De Hinojos (H)	1992	1080	J	17
Spain	Embalse De Finisterre (To)	1990	1000	J	17
Spain	Caño Del Guadiamar Pnd (H)	1992	950	J	17
Spain	Parque Natural De El Hondo (A)	1997	915	J	17
Spain	Laguna De Manjavacas (Cu)	1999	903	J	17
Spain	Laguna Chica - Villafranca De Los Caballeros (To)	1997	864	J	17
Spain	Laguna De Ontalafia (Ab)	1990	785	J	17
Spain	Charcones De Miguel Esteban (To)	1998	709	J	17

Table 2.34 continued: Red-crested Pochard *Netta rufina*

Country	Sitename	Year	Count	Type	Ref.
Spain	Lucios De Veta Lengua Y Aguas Rubias (H)	1992	620	J	17
Spain	Salinas De Santa Pola (A)	2000	511	J	17
Spain	Lucio De Marilópez Grande (Se)	1992	500	J	17
Switzerland	Vierwaldstättersee	2000	11766	J	17
Switzerland	Lac De Neuchâtel	2001	9730	J	17
Switzerland	Lac Léman-Ch	2002	4067	J	17
Tajikistan	Tigrovaya Balka Reserve; Left Bank Vakhsha River	2004	535	J	17
Turkey	Hirfanli Baraji	1996	3560	J	17
Turkey	Kizilirmak East (Balik)	1999	1826	J	17
Turkey	Egridir Golu	1992	1503	J	17
Turkey	Burdur Golu	1993	1212	J	17
Turkey	Isikli Golu [Civril Golu]	1992	1060	J	17
Turkey	Sapanca Golu	1995	1002	J	17
Turkey	Cavuscu Golu	1993	1000	J	17
Turkey	Beysehir Golu	1996	603	J	17
Turkey	Suleymanhali Golu	1992	600	J	17
Turkey	Koycegiz Golu	1996	528	J	17
Turkey	Yesilirmak Delta	1995	520	J	17
Turkmenistan	Krasnovodsk & North-Cheleken Bays	1991	67900	J	17
Turkmenistan	Lake Sarykamysh	1993	55070	J	17
Turkmenistan	Lake Ketdeshor (Kattashor)	1993	30600	J	17
Turkmenistan	Lake Romankuldogajik (30Km W. Of Kattashor)	1993	29000	J	17
Turkmenistan	Kelif Floodlands (Formerly Kelif Lakes)	1994	16900	J	17
Turkmenistan	Lake Dengizkul	1993	14170	J	17
Turkmenistan	Caspian Coast: Guyjuk-Okarem	1998	14089	J	17
Turkmenistan	Zeid Reservoir	1994	12300	J	17
Turkmenistan	Krasnovodsk Gulf (Convention Mar)(Turkmenbasti)	1999	9540	J	17
Turkmenistan	Caspian Coast: The Karshy'S Bay At Karasengir Cape	1999	8600	J	17
Turkmenistan	Khauzkhan Reservoir	2000	7803	J	17
Turkmenistan	Soltandzhar Reservoir	2003	7469	J	17
Turkmenistan	Amudarya Valley: Kerki-Karabekaul	1994	7100	J	17
Turkmenistan	Lake Soltantagt	1996	7000	J	17
Turkmenistan	North Cheleken Gulf	1999	6490	J	17
Turkmenistan	Caspian Coast: Okarem-Cheleken	1998	4478	J	17
Turkmenistan	Dzharsai River Floodplains (Jarsay Collector)	1994	4200	J	17
Turkmenistan	Lake Kernai (Aybugir)	1993	4200	J	17
Turkmenistan	Caspian Coast: Ayim Shore At Kenejy Islands	2000	3600	J	17
Turkmenistan	Caspian Coast: Bay Initial Of Karabogazgol Strait	1999	3100	J	17
Turkmenistan	Caspian Coast: Karabogazgol Strait-Bekdash	2004	3020	J	17
Turkmenistan	Balkhan Gulf (Convention Mar)	2000	2780	J	17
Turkmenistan	Caspian Coast: Kyanly Bay	1999	2760	J	17
Turkmenistan	Caspian Coast: Kuulimayak-Karabogazgol	1998	2519	J	17
Turkmenistan	Tuyamuyun Reservoir	1994	2500	J	17
Turkmenistan	Mikhaylov Gulf (Convention Mar)	2003	2166	J	17
Turkmenistan	Caspian Coast: Karababa Shore	1999	1705	J	17
Turkmenistan	Khivin Oasis Lakes	1991	1500	J	17
Turkmenistan	Amudarya Valley: Darganata-Lebap	1995	1280	J	17
Turkmenistan	Lakes Kyzylburun.Ainakul;Tailak;Turangulduz	1994	1200	J	17
Turkmenistan	Khangui River Floodplains	1994	1068	J	17

Table 2.34 continued: Red-crested Pochard *Netta rufina*

Country	Sitename	Year	Count	Type	Ref.
Turkmenistan	Amudarya Valley: Mukry-Kerki	1994	1000	J	17
Turkmenistan	Kopetdag Reservoir	2004	930	J	17
Turkmenistan	Caspian Coast: Kuvly-Mayak Floodlands	2000	707	J	17
Turkmenistan	Amudarya Valley: Chardjev-Cheidi (Neftezavodsk)	1993	705	J	17
Turkmenistan	Karakum Canal Betw. Khauzkhan Res. And Mary Oasis	2000	700	J	17
Turkmenistan	Yolotan Reservoir	1994	678	J	17
Turkmenistan	Gatygyzyl Collector (Seirab River Floodplains)	1994	630	J	17
Turkmenistan	Lake Koiunkyrlan (Incl. Floodplain)	1994	614	J	17
Turkmenistan	Amudarya Valley: Karabekaul-Chardjev	1994	560	J	17
Turkmenistan	Lake Kornai	1994	520	J	17
Ukraine	E. Sivash	2000	10000	J	17
Uzbekistan	Karakir Lakes System	2004	41700	J	17
Uzbekistan	Ullishorkul Lake	1995	40042	J	17
Uzbekistan	Zekry Lake	2004	17785	J	17
Uzbekistan	Dengizkul Lake	1991	3760	J	17
Uzbekistan	Zamanbobo Lake	1991	2000	J	17
Uzbekistan	Khivin Oasis Lakes	1991	1500	J	17
Uzbekistan	Arnasai Lakes	1991	1074	J	17
Uzbekistan	Syrdarya River . Fergana Valley-Chardara Reservoir	2004	747	J	17
Uzbekistan	Aidar System	2004	735	J	17

2.19.2 Red-crested Pochard movements

This is a Palearctic species breeding locally across southern and central Europe to west and central Asia. The Red-crested Pochard is migratory or partially migratory, except for a small feral population in the UK, which is largely sedentary. In western Europe wintering concentrations occur in southern Germany and Switzerland and locally in Spain. The major wintering concentrations occur around the Caspian Sea and eastwards into Turkmenistan.

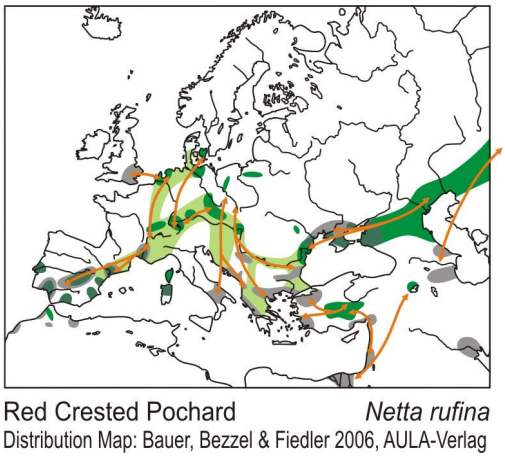


Figure 2.42: Map depicting the movements of Red-crested Pochard (*Netta rufina*) based on published information and ring recoveries in the EURING Data Bank.

The Red-crested Pochard has been ringed in low numbers in Europe and the largest numbers of recoveries have been received from birds ringed in Denmark, Germany, Russia and Spain. From the months December – February most recoveries are reported in western and southern Europe and a few also in the area of the Black and Caspian Seas. A few recoveries are reported in southern Russia and southern Siberia during the breeding season. A concentration of recoveries is found in the Sea of Azov during autumn and this is also known as an important wintering site for Red-crested Pochard. Birds breeding in western Europe are partially migratory and move only short distances. Eastern and southeastern European and Russian breeders winter in the area of the Black and Caspian Seas, while birds breeding in Turkey and Azerbaijan winter in Egypt and southwest Asia. The species is known to perform moult migrations and birds from southern France gather in lakes in southern Germany and Switzerland, Principally the Boden See (Lake Constance).

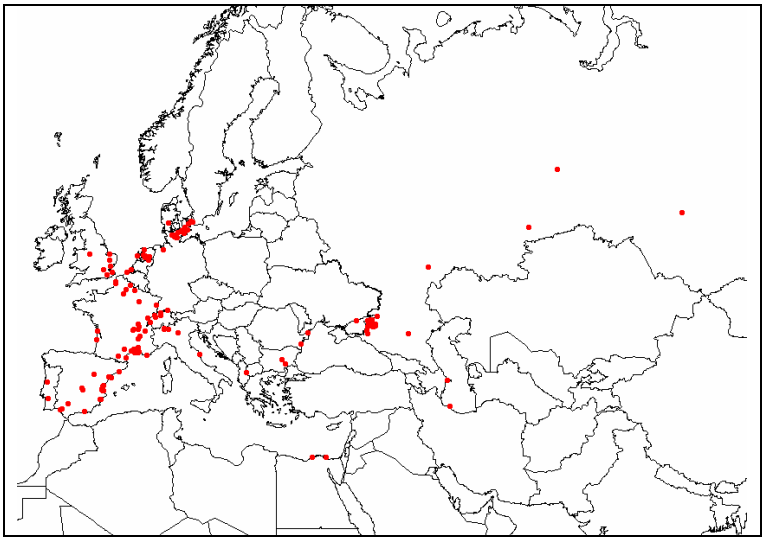
Table 2.35: Summary of the movements of Red-crested Pochard (*Netta rufina*) from the literature based on published information and ring recoveries in the EURING Data Bank.

Red-crested Pochard *Netta rufina*

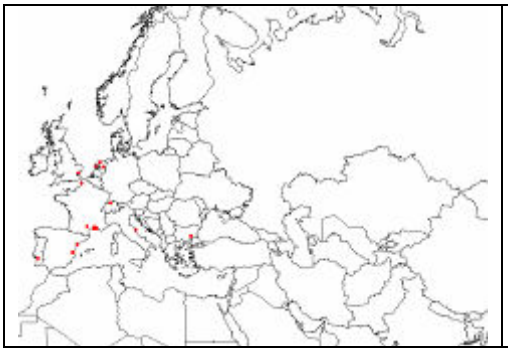
Distribution: Palaearctic, from Iberia across southern and central Europe to west and central Asia

Moult: partly at Lake Constance, SW Baltic, Netherlands

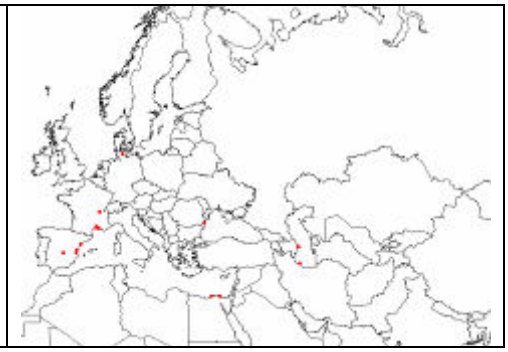
Population (or part of population)	Autumn Migration		Wintering / Non-breeding Grounds		Spring Migration		References
	direction / via	During	location	during	direction / via	during	
Northern Europe (Sweden, Netherlands, Denmark (occasionally))	SSW, via Netherlands ?	from Aug	Lake Constance (Germany), France, Italy, Spain, Netherlands, Denmark			to Apr	1, 4, 5
Central European (Germany, Austria)			(partially migratory) S-France, Iberia				8, own data
SE-Europe			Black Sea, East Mediterranean				8
Turkey			Black Sea, East Mediterranean				
Eastern European (Poland, Czech Republic, Slovak Rep.)			Black Sea region (probably east as far as Caspian sea)				1, 8
European Russia east to Volga Delta			North Caspian				8
Central Asia			Caspian and Black Sea region, SW-Asia				8
Transcaspian breeding population			Eastern Caspian, SW-Asia				8
Turkey, Azerbajian			Egypt, Asia, India				1
Krasnovodsk-north Cheleken Bays, Lake Sarakamysh			increasing numbers into south Caspian region during cold winters; Iran, increasing during cold winters				8



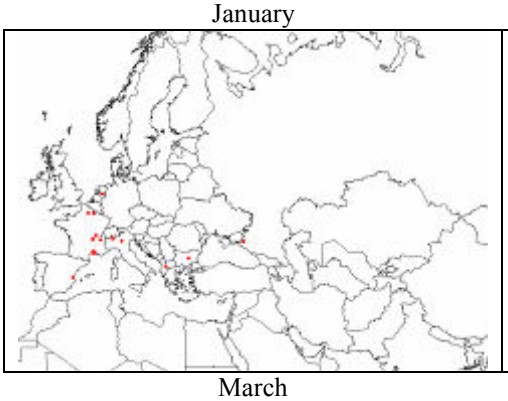
Finding locations of all dead birds



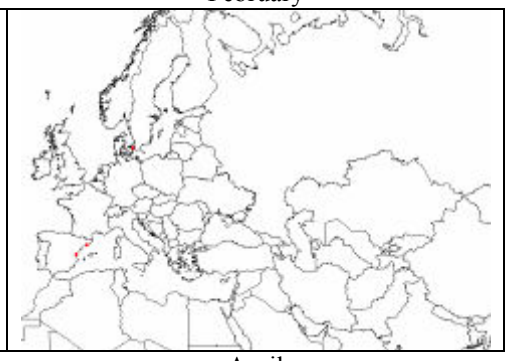
January



February



March



April

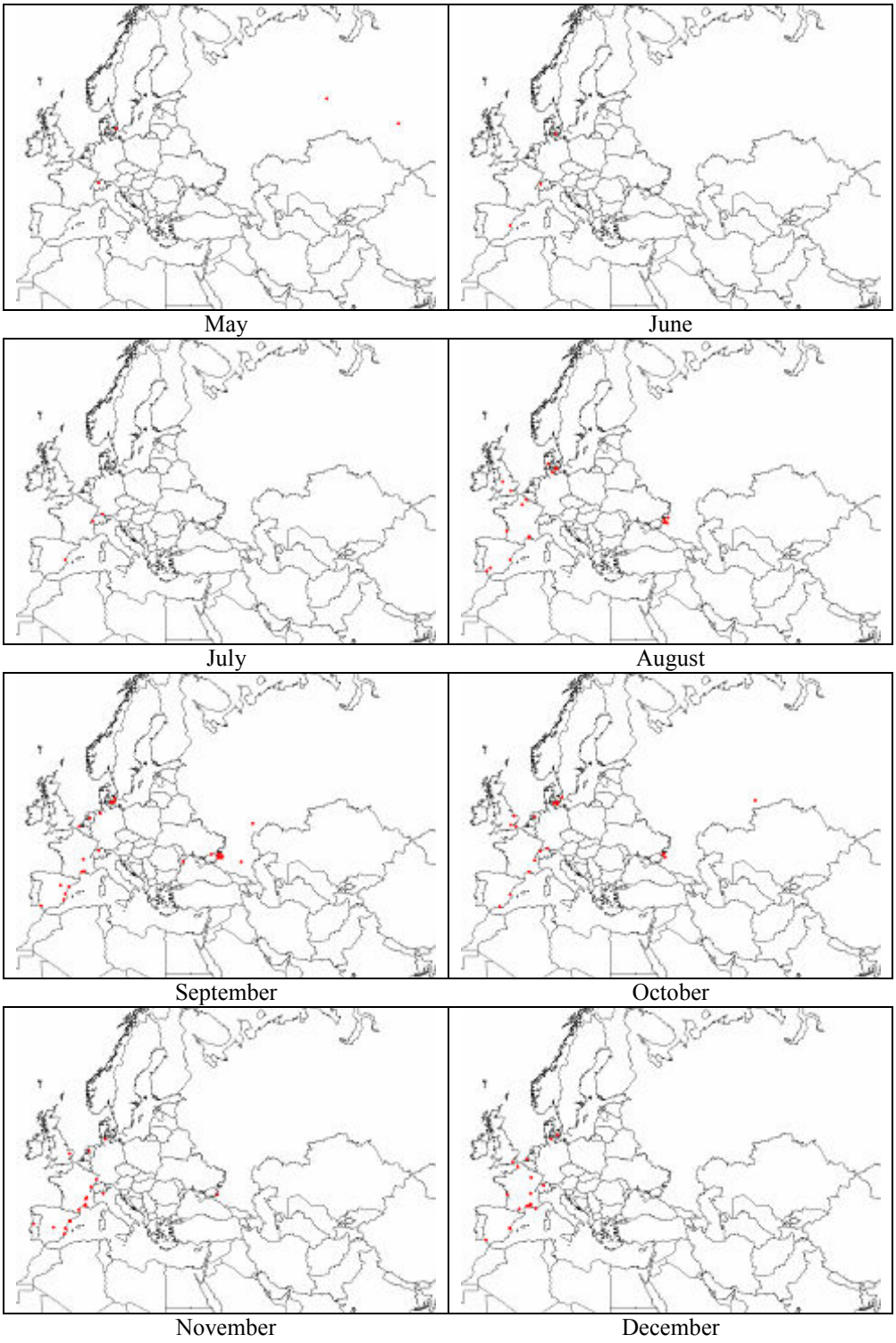


Figure 2.43: Finding locations of all Red-crested Pochard (*Netta rufina*) in the EURING data bank. All birds are presented and also broken down by month.

2.20 Common Pochard (*Aythya ferina*)

2.20.1 Numbers and distribution

There are large winter concentrations of Common Pochard in Central and West Asia, especially around the southern Caspian Sea (Figure 2.44). A concentration exceeding 450,000 mixed Tufted Ducks and Common Pochards has been recorded in the Volga Delta. The Wetern Black Sea region also holds very large numbers, and there are many key sites in Turkey and the Balkans. In central and western Europe, important centres of distribution are the lakes north of the Alps and The Netherlands. High numbers are also found in Germany, France, Spain and the UK. In Africa the wintering range extends to Morocco, Algeria, Tunisia, Egypt and Sudan.

The highest January counts have been recorded in Azerbaijan at Gyzylagach Nature Reserve, where a peak count of 197,000 has been recorded, and at Kirov Bay where 93,300 were counted in 1991 (Table 2. 36). Counts exceeding 10,000 have been made at a further four sites in Azerbaijan, making six in all. Counts at this level have also been made at six sites in Turkmenistan, six in Iran, three in Kazakhstan and one in Uzbekistan. Further west, the highest numbers have been recorded in the Black Sea-East Mediterranean region, where more than 10,000 have been counted at 13 sites in Turkey, most notably 47,833 at Beysehir Golu in 1996, 45,200 at Uluabat Golu in 1996 and 40,740 at Egridir Golu in 1999. In Romania, counts of 10,000 or more have been made at nine sites, the most important of which are Portile de Fier Reservoir, where 60,600 were counted in 1998, Chituc (Vadu – Periboina) where there were 40,000 in 1993 and Razelm Northwest where 30,000 were counted in 1994. The Limans and Bays of the Ukrainian Black Sea coast include seven sites where more than 10,000 Common Pochards have been counted, including 43,000 in 1995 at Dzansheisky (Shagany, Alibey and Burnas Limans), Skadarsko Jezero in Serbia-Montenegro and Albania is a crucial site where 55,000 were counted in 1994, and in Greece, of 5 sites where counts exceeding 10,000 have been made, Amvrakikos Wetlands recorded the highest peak count, 22,850 in 1996.

The most important site in central and western Europe is the Bodensee in Germany-Switzerland-Austria where 46,897 were counted in 1997, and three more sites in Germany and three in Switzerland have recorded between 10,000 and 25,000 Common Pochards. Further north, Loughs Neagh and Beg in The UK recorded a peak count of 38,998 in 1992, (but numbers decreased markedly in the 2000s) and in The Netherlands, two sites recorded peaks of 20,000, Veluwemeer in 1999 and Ijsselmeer in 1992. In France, peaks of between 10,000 and 16,000 Common Pochards have been counted at six sites, the highest of which was 15,882 at Lac du Bourget in 2002. The West Mediterranean region holds a number of important concentrations in Tunisia, where Lac Ichkeul recorded 35,000 in 1998 and Lac de Bizerte 25,280 in 1994, in Spain, where Laguna de Gallocanta recorded 38,960 in 1992, and in Italy where there were 13,988 at Oristano in 1995.

Table 2.36: Common Pochard *Aythya ferina*: Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 3,500 or more have been recorded.

Country	Sitename	Year	Count	Type	Ref.
Albania	Lake Skadar	2004	5920	J	17
Algeria	Lac Tonga	1994	7264	J	17
Algeria	Lac Oubeira	1996	4500	J	17
Azerbaijan	Caspian Coast: Gyzylagach Nature Reserve		197000	J	17
Azerbaijan	Kirov Bay	1991	93300	J	17
Azerbaijan	Sarysu Lake (Sarasuy)		35515	J	17
Azerbaijan	Caspian Coast: Pyrallahy Island		12750	J	17
Azerbaijan	Mahmud-Chala Lake (Third Chala)	1996	11500	J	17
Azerbaijan	Caspian Coast: Alyat Bay		9034	J	17
Azerbaijan	Caspian Coast: Factory Shelf		7014	J	17
Azerbaijan	Pyrallahy Island	1997	4109	J	17
Azerbaijan	Caspian Coast: Gobustan Bay		3650	J	17
Belgium	Liège Pont De Fragnée - Pont Atlas + Dér	1997	6629	J	17
Belgium	Netevallei Lier-Duffel	1996	3823	J	17
Bulgaria	Mandra Lake Complex	1993	16720	J	17
Bulgaria	Varna Lake Complex: Varnensko, Beloslavsko, Iatata Yatata	1993	10621	J	17
Bulgaria	Burgas Lake (Vaya)	1992	9918	J	17
Bulgaria	Black Sea Coast: Kamchia Estuary-Obzor	1996	5090	J	17
Bulgaria	Black Sea Coast: Daliana-Vlass Coast	1996	4800	J	17
Bulgaria	Black Sea Coast: Kraimorie-	1995	4515	J	17
Bulgaria	Black Sea Coast: Marsh Alepu (Including Adjacent Sea)	1997	3970	J	17
Bulgaria	Black Sea Coast: Slanchev Briag Slunchev Bryag-Camp. Acheloy	1996	3530	J	17
Czech Republic	Vltava: Liben-Podbaba	1995	3750	J	17
Egypt	Lake Burullus	1990	7357	J	17
France	Lac Du Bourget	2002	15882	J	17
France	La Camargue	1992	13700	J	17
France	Complexe De L'Etang De Berre	1996	12559	J	17
France	Haut Rhône (01 / 73 / 74)	2003	12035	J	17
France	Dombes-Vallée De L'Ain	2000	11834	J	17
France	Etangs De La Brenne	2001	10995	J	17
France	Bas Rhône-Basse Isère	1990	6266	J	17
France	Cours Du Rhin (67 / 68)	1990	6212	J	17
France	Bassin Du Leman (Lac Léman+Rhône+Plans D'Eau Annexes)	1999	4912	J	17
France	Etang De Biguglia	1995	4800	J	17
France	Lac De Grandlieu	1999	4600	J	17
France	Val De Seine De Vernon A Pont De L'Arche	1990	4510	J	17
France	Résèrve De La Grande Noe	1998	4252	J	17
France	Lac Du Der-Chantecoq (51 / 52)	1998	3723	J	17
Germany	Donau: Km 2246-2405	1991	12075	J	17
Germany	Barther Strom	1990	10000	J	17
Germany	Rhein Bei Wiesbaden-Amöneburg (Rhein-Km 501.3-502;5)	1995	8200	J	17
Germany	Ahrenshoop-Meiningen	1991	8100	J	17
Germany	Ribnitz-Dierhagen	1992	5000	J	17
Germany	Kleiner Jasmunder Bodden	1991	4733	J	17
Germany	Main: Dettingen-Oberrad	1993	4593	J	17
Germany	Seehof-Wittower Fähre-Breetzer Bodden	1996	4200	J	17
Germany	Unterwarnow Und Breitling	1993	3900	J	17
Germany	Steinhuder Meer	2000	3564	J	17
Germany / Switzerland / Austria	Bodensee Gesamt	1997	46897	J	17
Greece	Amvrakikos Wetlands	1996	22850	J	17
Greece	Kerkini	2001	15900	J	17
Greece	Evros Delta	1998	15000	J	17

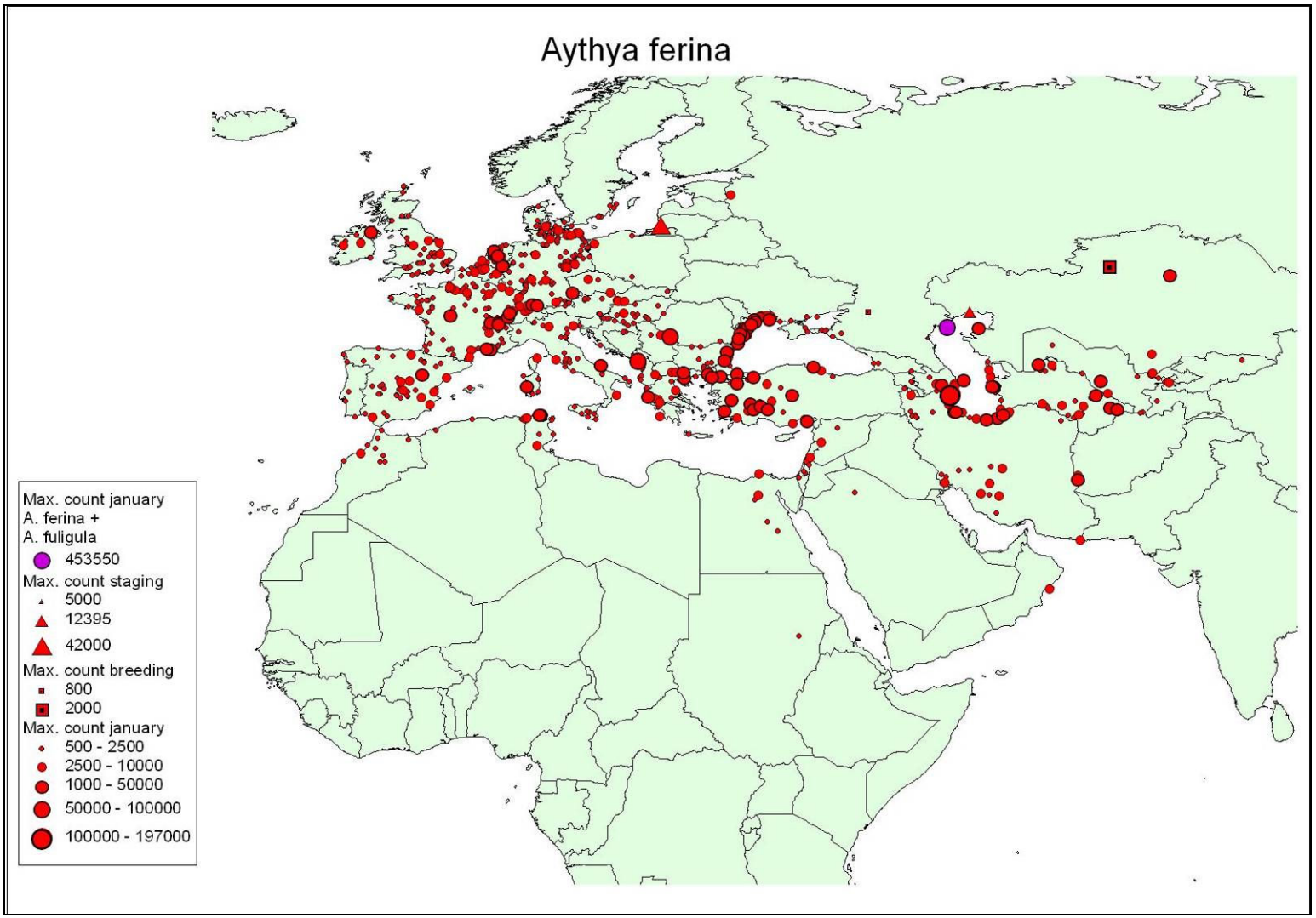


Figure 2.44: Common Pochard *Aythya ferina*: Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 500 or more have been recorded.

Table 2.36 continued: Common Pochard *Aythya ferina*

Country	Sitename	Year	Count	Type	Ref.
Greece	Volvi	1990	14800	J	17
Greece	Vistonis (Bourou)	1995	14050	J	17
Greece	Karla Reservoirs (Former L.Karla)	1996	7529	J	17
Greece	Messolonghi Lagoon (From River Evinos To River Acheloos)	1990	5850	J	17
Greece	Koronia (Langada)	1994	3849	J	17
Greece	Doirani (Secondary)	1998	3700	J	17
Iran	Fereydoon Kenar, Ezbaran & Sorkh Rud Damgahs: Damgah Fereydoon Ke	1993	31200	J	17
Iran	Gomishan Marsh	1991	17000	J	17
Iran	Anzali Mordab Complex: Anzali Marsh East	2003	16800	J	17
Iran	Anzali Mordab Complex: Siakeshim Protected Region	2003	13500	J	17
Iran	Miankaleh W.R. & Gorgan Bay: Miankaleh Protected Region	1998	12500	J	17
Iran	Hamoun Lakes Complex: Kuh-I-Khajeh	1997	11740	J	17
Iran	Govater Bay & Hur-E-Bahu: Bahookalat River	1994	9620	J	17
Iran	Anzali Mordab Complex: Selkeh Protected Region	2003	8700	J	17
Iran	Caspian Coast (Gilan): Astara – Hashtpar	2003	5700	J	17
Iran	Caspian Coast: Ashuradeh-Khazarabad(Farahabad)	2003	5296	J	17
Iran	Anar Marz Ab-Bandan	1998	5000	J	17
Iran	Shadegan Marshes Protected Region: Total	1990	4928	J	17
Iran	Anzali Mordab Complex: Anzali Mars West (Main Lagoon)	2003	4850	J	17
Iran	Caspian Sea Coast (Mazandaran): Ramsar - Babolsar	1992	4656	J	17
Iran	Amirlayeh & Sheikh Ali Kol: Amirlayeh Lake	2003	4600	J	17
Iran	Miankaleh W.R. & Gorgan Bay: Gorgan Bay	1998	4470	J	17
Iran	Aras River: Bralan - Aras Dam	1997	4000	J	17
Iran	Dasht-E-Arjan Marsh	1994	3928	J	17
Iran	Ala Gol Marshes: Ulma Gol	1995	3500	J	17
Iran	Chookam Ab-Bandan	2003	3500	J	17
Ireland	Lough Corrib: Total	1997	4240	J	17
Italy	Oristano	1995	13488	J	17
Italy	Laghi Di Lesina E Varano	1996	10917	J	17
Italy	Laguna Di Caorle E Valli Di Bibione	1999	4916	J	17
Italy	Lago Di Garda	2002	4672	J	17
Italy	Orbetello E Burano	1999	4264	J	17
Kazakhstan	Kurgaldjinskyi Reserve	1995	48569	J	17
Kazakhstan	Caspian Coast. O-Va Durneva-Turmenia Border (300Km	1991	20000	J	17
Kazakhstan	Chuchkakol Lakes	2004	5045	J	17
Kazakhstan	Chardara Vdchr	1992	5000	J	17
Kazakhstan	North Caspian Coast total	2002	12395	S	13
Macedonia	Lake Dojran	1990	5600	J	17
Macedonia	Lake Ohrid-Macedonian Part	1998	4407	J	17
Morocco	Barrage Al Massira: Settat	1995	4430	J	17
Netherlands	Veluwemeer	1999	20040	J	17
Netherlands	Ijsselmeer	1992	19792	J	17
Netherlands	Limburgse Maas	1997	14310	J	17
Netherlands	Wolderwijd	1998	12750	J	17
Netherlands	Gooimeer	1995	9355	J	17
Netherlands	Markermeer	1990	8432	J	17
Netherlands	Eemmeer. Nijkerkernauw En Nuldernauw	1995	5872	J	17
Netherlands	Ketelmeer	1992	5476	J	17
Netherlands	Ijssel	2000	4724	J	17
Netherlands	Tjeukemeer	1998	3621	J	17
Oman	Barr Al Hikman	1999	4029	J	17
Romania	Portile De Fier Reservoir (Romanian Part)	1998	60600	J	17
Romania	Chituc (Vadu-Periboina)	1993	40000	J	17
Romania	Razelm NW	1994	30000	J	17

Table 2.36 continued: Common Pochard *Aythya ferina*

Country	Sitename	Year	Count	Type	Ref.
Romania	Agigea-N.Eforie	1997	18000	J	17
Romania	Periteasca-Portita (244402911 + 244402912)	1990	15000	J	17
Romania	Delta Dunarii (Danube Delta)	1994	13283	J	17
Romania	Gura Portitei-Gr.Periboina	1997	12250	J	17
Romania	Lake Sinoe (= Sinoie)	1990	10000	J	17
Romania	Portita-Bisericuta	1994	10000	J	17
Romania	Lake Razelm	1991	8000	J	17
Romania	Razelm Ne	1994	8000	J	17
Romania	Gr. Buhazu (Vadu)	1997	7800	J	17
Romania	Razelm Se (Bisericuta-Periteasca)	1991	7000	J	17
Romania	Sf. Gheorghe-I. Sacalin	1990	6000	J	17
Romania	Black Sea Coast. 12 Sîtes(30 Km)	1996	5090	J	17
Romania	Island Sahalin-Melea (= Sahalin I.- Mainland)	1990	5000	J	17
Romania	Sf. Eforie-Costinesti	1999	4800	J	17
Romania	Techirghiol	1993	4500	J	17
Romania	N. Eforie-S. Eforie	1997	4300	J	17
Romania	Leahova-Periteasca	1991	4000	J	17
Russia	Pskovsko-Chudskaya Lowland		8000	J	17
Russia	Neman River delta		42000	S	35
Russia	Kyzlyar Bay		5000	S	7
Slovakia	Podunaji (Danube Floodplain)	1993	9209	J	17
Slovakia	Hrusov Dam From Dunaj'S Mouth To Cunovo	1999	8950	J	17
Spain	Laguna De Gallocanta (Z)	1992	38960	J	17
Spain	Parque Natural De El Hondo (A)	1999	9811	J	17
Spain	Gravera Del Porcal (M)	1995	5700	J	17
Spain	Embalse De Ullivarri (Vi)	1993	5512	J	17
Spain	Delta Del Ebro (T)	1995	3928	J	17
Spain	Embalse De Buendía (Cu)	2001	3921	J	17
Spain	Laguna Chica - Villafranca De Los Caballeros (To)	1998	3788	J	17
Switzerland	Lac De Neuchâtel	1996	24095	J	17
Switzerland	Lac Léman-Ch	2000	17391	J	17
Switzerland	Bielersee	1996	5734	J	17
Syria	Qattine	1995	8000	J	17
Tajikistan	Kairak-Kumsk Reservoir (Kairakkum Res.)	2004	4320	J	17
Tunisia	Lac Ichkeul	1998	35000	J	17
Tunisia	Lac De Bizerte	1994	25280	J	17
Tunisia	Sebkha Sidi Mansour	1991	4950	J	17
Turkey	Beysehir Golu	1996	47833	J	17
Turkey	Uluabat Golu (Apolyont Golu)	1996	45200	J	17
Turkey	Egridir Golu	1999	40740	J	17
Turkey	Burdur Golu	1992	37083	J	17
Turkey	Bafa Golu	1996	27085	J	17
Turkey	Marmara Golu	1996	18690	J	17
Turkey	Isikli Golu [Civril Golu]	1993	18370	J	17
Turkey	Akyatan Golu	1992	16801	J	17
Turkey	Meric Delta	1996	15528	J	17
Turkey	Kizilirmak East (Balik)	1996	14952	J	17
Turkey	Sapanca Golu	1999	14392	J	17
Turkey	Buyuk Cekmece	1996	14036	J	17
Turkey	Hirfanli Baraji	1996	13430	J	17
Turkey	Kizilirmak (Karabogaz+Balik)	1995	8367	J	17
Turkey	Terkos Golu	1995	7700	J	17
Turkey	Hoyran Golu(+Egridir Since '86	1990	6344	J	17
Turkey	Salda Golu	1993	6067	J	17
Turkey	Cavuscu Golu	1993	5550	J	17
Turkey	Yesilirmak Delta	1996	5400	J	17

Table 2.36 continued: Common Pochard *Aythya ferina*

Country	Sitename	Year	Count	Type	Ref.
Turkey	Koca Delta (W Part)(= Kocacay)	1995	5270	J	17
Turkey	Goksu Delta (Silifke)	1990	5110	J	17
Turkey	Koycegiz Golu	1996	3845	J	17
Turkmenistan	Krasnovodsk & North-Cheleken Bays	1991	33700	J	17
Turkmenistan	Lake Sarykamysh	1991	31430	J	17
Turkmenistan	Krasnovodsk Gulf (Convention Mar)(Turkmenbasti)	2003	20730	J	17
Turkmenistan	Zeid Reservoir	2004	15303	J	17
Turkmenistan	Kelif Floodlands (Formerly Kelif Lakes)	1994	15200	J	17
Turkmenistan	Lake Ketdeshor (Kattashor)	1995	11200	J	17
Turkmenistan	Caspian Coast: Guyjuk-Okarem	1998	9124	J	17
Turkmenistan	Khauzkhan Reservoir	2000	9100	J	17
Turkmenistan	Lake Dengizkul	1993	9000	J	17
Turkmenistan	Soltandzhar Reservoir	1997	8300	J	17
Turkmenistan	Caspian Coast: Chikishlyar Shore	2004	8002	J	17
Turkmenistan	North Cheleken Gulf	2003	6302	J	17
Turkmenistan	Caspian Coast: Karabogazgol Strait-Bekdash	2004	6017	J	17
Turkmenistan	Caspian Coast: Sea North Of North-Cheleken Spit	2003	5013	J	17
Turkmenistan	Kopetdag Reservoir	1998	3962	J	17
Turkmenistan	Caspian Coast: Kuulimayak-Karabogazgol	1998	3783	J	17
Turkmenistan	Caspian Coast: Ayim Shore At Kenejy Islands	2003	3503	J	17
Ukraine	Dzansheisky. Shagany; Alibey; Burnas Limans	1995	43000	J	17
Ukraine	Budaksky + Gribovsky Limans	1991	20100	J	17
Ukraine	Gebriianov Bay	1995	13500	J	17
Ukraine	Secondary Delta Of The Kiliya Channel (Danube)	2000	11625	J	17
Ukraine	Dnester Delta + Liman	1996	10500	J	17
Ukraine	Sasyk Liman + Adjacent Sea Area	1999	10000	J	17
Ukraine	Budaksky Liman	2000	8000	J	17
Ukraine	Danube Delta	1993	7900	J	17
Ukraine	Black Sea State Biosphere Reserve	1990	6882	J	17
Ukraine	Odessa Bay	1995	5000	J	17
United Kingdom	Loughs Neagh & Beg	1992	38998	J	17
United Kingdom	Ouse Washes	1999	5383	J	17
Uzbekistan	Karakir Lakes System	2004	34050	J	17
Serbia&Montenegro -Albania	Skadarsko Jezero	1994	55000	J	17
Yugoslavia	Dunav: Ram	1990	6860	J	17
Yugoslavia	Dunav: Donji Milanovac	1998	5000	J	17

2.20.2 Common Pochard movements

The Pochard breeds in the Palearctic, from western Europe to north-eastern China between 45°N and about 60°N. In western and southern Europe, it is present throughout the year, but otherwise highly migratory. Wintering areas spread out from western and southern Europe through southern Asia to Japan. In winter, it is relatively widespread across central and north-western Europe with major concentrations in Germany, France, The Netherlands and the UK. Other notable concentrations occur in Switzerland, and in countries around the Black and Caspian Seas. Only small numbers are found during winter in north Africa and very few south of the Sahara.

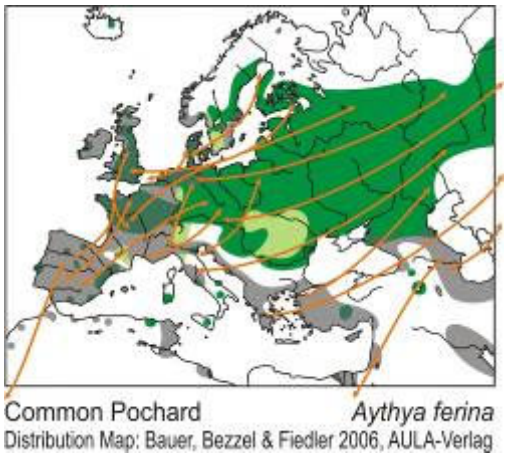


Figure 2.45: Map depicting the movements of Common Pochard (*Aythya ferina*) based on published information and ring recoveries in the EURING Data Bank.

Fairly low numbers of Pochard have been ringed in most countries and the largest numbers of recoveries are from birds ringed in Switzerland, Britain and Russia. Most of the recoveries during the period December to February are reported in western and southern Europe, including Denmark and southern Sweden, as well as in northwest Africa. A general decrease in recoveries from Western and Mediterranean Europe is recorded between January and February, becoming more intense in March; return migration continues in Russia in the east until May. Recoveries from the breeding season (May – June) are spread out from west Europe to about 75°E in Russia. A strong concentration of recoveries is found in the Ob-Irtysh basin, east of the Urals and north of Kazakhstan. The autumn migration starts in August and small numbers of birds are still present in Russia in October. Pochards breeding in northern and central Europe migrate to wintering areas in west Europe. Birds breeding in Britain & Ireland are resident or move to the continent, as far south as Spain. West and central Russian breeders move W to west Europe and Britain and birds breeding in southwest Siberia and Kazakhstan migrate to the Caspian Sea, Black Sea and west to Italy. Pochards breeding further east in Siberia and Central Asia winter in southwest Asia. Moult migration in males occurs, but many of them remain and moult near breeding sites. Several ringing recoveries of Pochards have shown that complex and aberrant movements regularly take place.

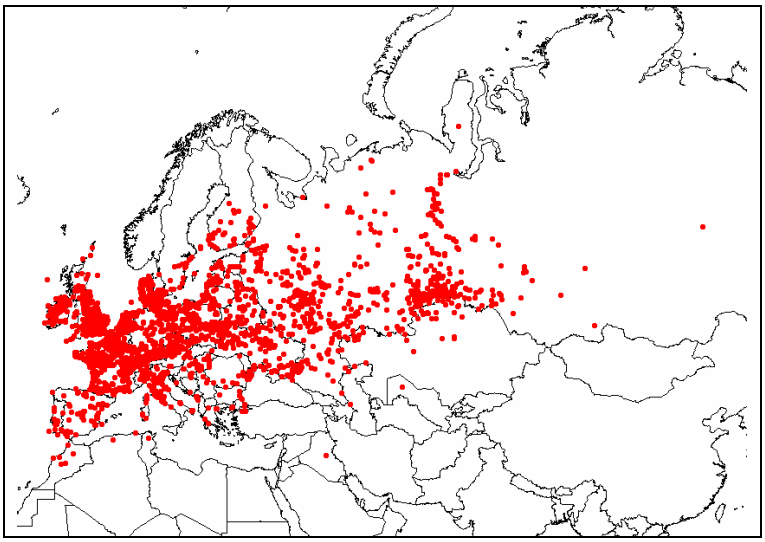
Table 2.37: Summary of the movements of Common Pochard *Aythya ferina*) from the literature based on published information and ring recoveries in the EURING Data Bank.

Common Pochard *Aythya ferina*

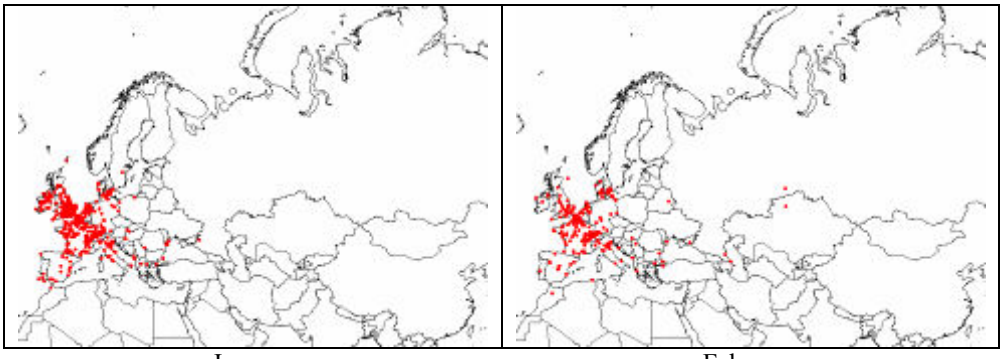
Distribution: Palearctic, southeastern Russia to northeastern China, western Europe, 120°E, between 45°N and 70°N; northern populations highly migratory, in western and southern Europe present throughout the year

Moult: early June and late August/September in or close to breeding ground

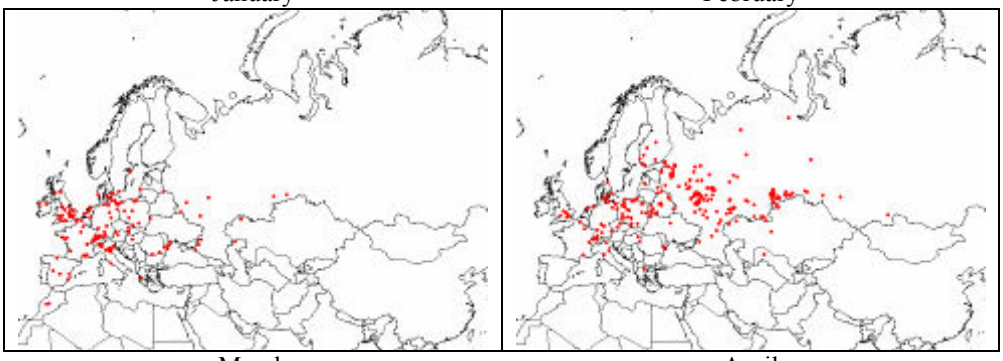
Population (or part of population)	Autumn Migration		Wintering / Non-breeding Grounds		Spring Migration		References
	direction / via	during	location	during	direction / via	during	
(no defined populations)	West to South	Sep-Oct (Nov)	from W- and S-Europe to North Africa		Feb-April		1, 5
Central Asia	West		Western Eurasia, Netherlands				2, 8
Finland	WSW		Britain, Netherlands, Belgium, Poland, Denmark, France, Spain, Albania				6, 7, 8
Northwest Europe, Baltic states, Poland	WSW, via Germany, West		Germany, Italy, Britain, Netherlands, Denmark				3, 5, 8, 12
England & Scotland	SSW to E		Spain, France, Switzerland, Netherlands				2, 3
(Eastern) Denmark	NNW to SSW	Sep-Nov	Britain, Netherlands, N-France, Spain, Germany, Switzerland, smaller groups occasionally to Gambia, Uganda, Tanzania, Poland, Estland, Lettland, Lithuania				2, 3 ,5, 6, 8
(Eastern) Sweden	W to SW		Sweden, Germany, France, Netherlands, Denmark		Mar-Apr		2, 4, 5, 8
Czech Republic	Germany	Aug	France				13
Russia	WSW		Britain, Netherlands, Denmark				2, 5, 8
Southern Russia	S to SW		Black Sea, Mediterranean				8
Southern and Central Europe	SW to SE	Sep-Oct	Black Sea, Mediterranean				8
Southern West and Central Siberia	W to SW		Black Sea, Mediterranean, Turkmenistan, Uzbekistan, Tadjikistan, India, Pakistan, Western Europe along Mediterranean, Caspian Sea, Italy				8, 11, 12
Kazakhstan, other central Asian republics			Black Sea, Mediterranean, Italy				8, 12
Central Asian republics, western and central Siberia			Southwest Asia, Poland, Belarus, Central Europe to Britain				8
Iran			India				8
NW Europe (350,000)		Sep-Nov			Mar-Apr		8
Central Europe, Black Sea/Mediterranean (1 million)	crossing Sahara		West Africa, e.g. Senegal, Mali, Nigeria, Chad				8
Southwest Asia (350,000)	via Azerbaijan (?)		Northeast Africa, most Sudan and Ethiopia, smaller troups occasionally to Gambia, Uganda, Tanzania		Mar-May		1, 8



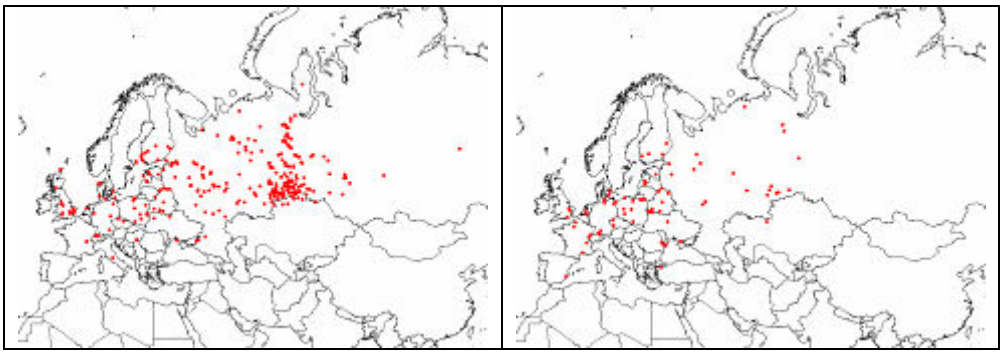
Finding locations of all dead birds



January February



March April



May June

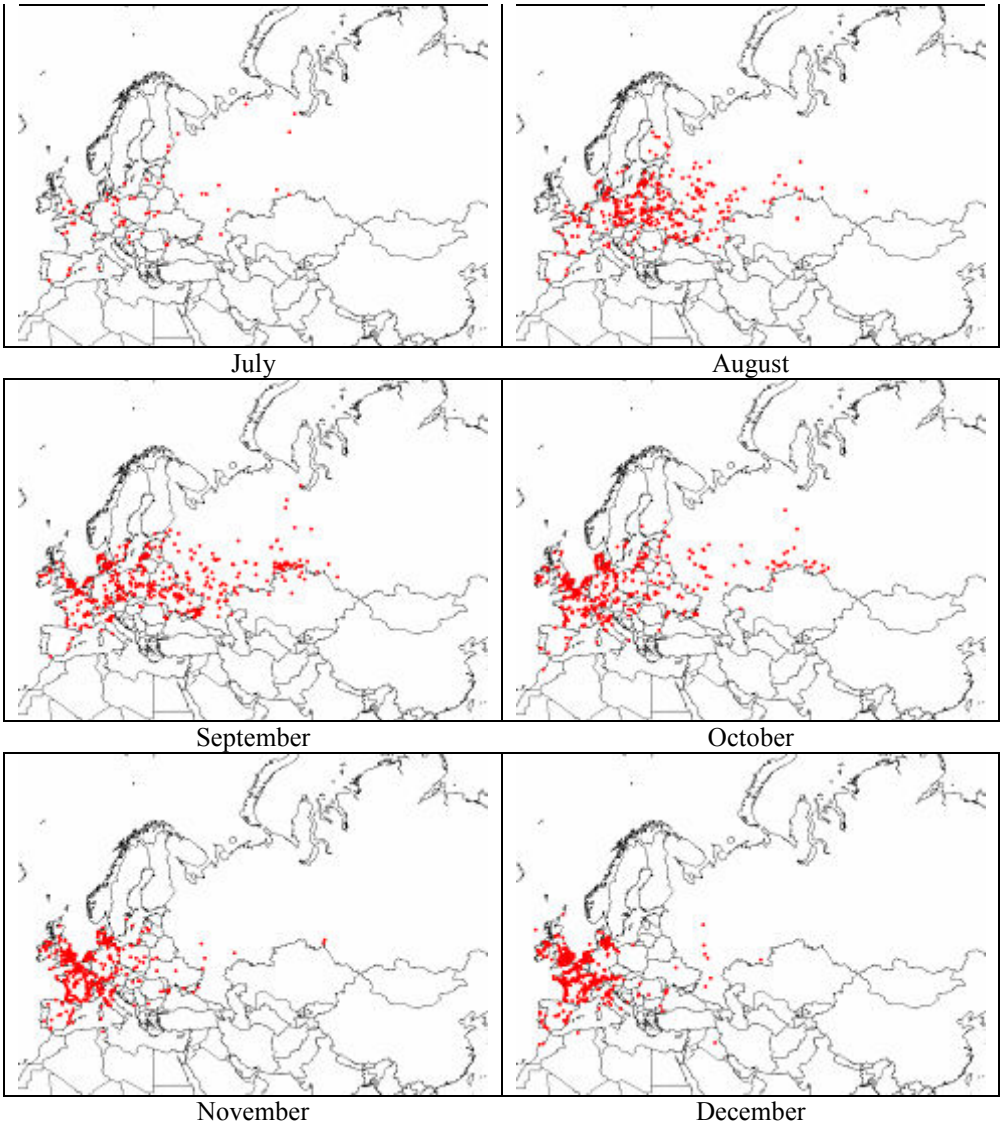


Figure 2.46: Finding locations of all Common Pochard (*Aythya ferina*) in the EURING data bank. All birds are presented and also broken down by month.

2.21 Tufted Duck (*Aythya fuligula*)

2.21.1 Numbers and distribution

Tufted Duck has a similar distribution to Common Pochard, but is more concentrated in Europe and less numerous in southern parts of the range around the Mediterranean and in Iran (Figure 2.47). The biggest concentration of key sites is in the eastern Baltic region including Denmark, eastern Germany, Poland and Sweden. Large concentrations are found north of the Alps in France, Switzerland, Germany, Austria and the Czech Republic, and The Netherlands and UK also hold large numbers. Further East, the western and northern Black Sea regions are important, with large numbers in Russia, Ukraine, Romania, Bulgaria and Turkey. The Caspian coast is also extremely important with especially high numbers in Russia, Azerbaijan and Turkmenistan. A concentration exceeding 450,000 mixed Tufted Ducks and Common Pochards has been recorded in the Volga Delta.

Table 2.38 shows that the most important site in Europe is the Bodensee in Germany-Switzerland-Austria where 82,542 were counted in 1996, and thirteen more sites in Germany and five in Switzerland have recorded January counts between 10,000 and 60,000 Tufted Ducks. These counts include 58,912 at Lac de Neuchatel in 1994, 37,032 at Lac Léman in 1990, and in Germany, 50,000 at Wismar-Hohen Wieschendorfer Huk, where 50,000 were counted in 1993, and the Grosser Plöner See where 23,660 were counted in 1995. There were 28,931 at Cours du Rhin (France) in January 1990, and two sites in The Netherlands recorded peak counts of around 28,700: Markermeer in 2000 and Ijsselmeer in 1992. A peak January count of 25,340 was made at Loughs Neagh and Beg in the UK in 1996 (but numbers decreased markedly there in the 2000s).

The biggest concentration of important sites is in the eastern Baltic Sea where key sites in Denmark include Roskilde Fjord, where 53,920 Tufted Ducks were counted in 1995, Maribo Soerne where there were 31,200 in 2000 and Sydfynske Hav where 20,992 were counted in 1994. Further east in the Baltic, the Neman river Delta in Russia has recorded a peak count of 50,000, and in Poland there were 33,275 at Jez.Dabie in 1993 and 17,898 at Zat. Gdanska in 1996. In southeast Europe, 80,000 were counted at Chituc (Vadu – Periboina) in Romania in 1993 and there were 40,000 at Skadarsko Jezero on the border between Montenegro and Albania in the same year. Peak counts were made of 20,000 at Sasyk Liman, Ukraine in 2000 and 15,803 at Burgas Lake, Bulgaria in 1992. The Turkish lakes hold fewer of this species than Common Pochard, and the highest peak count was 14,550 at Hirfani Baraji in 1996.

Numbers are also lower in West and Central Asia than for Common Pochard, but there are a number of key sites around the Caspian Sea. Gyzylagach Nature Reserve, Azerbaijan is the most important of these, and a peak count of 81,000 was recorded there. Peak January counts at five additional sites in Azerbaijan exceeded 10,000, and there were six such counts in Turkmenistan, the highest at Lake Sarykamysh in 2003, when 22,190 were counted. In Iran there were 16,744 at Lake Uromieh in 1997.

Table 2.38: Tufted Duck *Aythya fuligula*: Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 5,000 or more have been recorded.

Country	Sitename	Year	Count	Type	Ref.
Azerbaijan	Caspian Coast: Gyzylagach Nature Reserve		81000	J	17
Azerbaijan	Caspian Coast: Yashma Is. and Gilazy Spit		24753	J	17
Azerbaijan	Caspian Coast: Sangachal Bay		24500	J	17
Azerbaijan	Caspian Coast: Shakdilli Spit		15043	J	17
Azerbaijan	Caspian Coast: Alyat Bay		11097	J	17
Azerbaijan	Caspian Coast: Pirsagat Cape		10450	J	17
Azerbaijan	Caspian Coast: Gobustan Bay		9720	J	17
Azerbaijan	Aggel (Ah Gol) Lake	1991	9000	J	17
Azerbaijan	Sangachal Cape	1997	8000	J	17
Azerbaijan	Narimanabad Coast	1996	7712	J	17
Azerbaijan	Caspian Coast: Pyrallahy Island		7156	J	17
Azerbaijan	Caspian Coast: Seashore Turkan-Hovsan		6650	J	17
Azerbaijan	Caspian Coast: Baku-Shakdilli Spit	1998	5500	J	17
Azerbaijan	Caspian Coast: Factory Shelf		5309	J	17
Azerbaijan	Alyat Bay and nearest islands	1996	10300	S	34
Belgium	Rodenhuizedok Terdonk	1997	8900	J	17
Bulgaria	Burgas Lake (Vaya)	1992	15803	J	17
Bulgaria	Mandra Lake Complex	1994	6458	J	17
Denmark	Roskilde Fjord	1995	53920	J	17
Denmark	Maribo Soerne	2000	31200	J	17
Denmark	Sydfynske Hav	1994	20992	J	17
Denmark	Gavno	1992	15300	J	17
Denmark	Guldborgsund	1992	10080	J	17
Denmark	Mariager Fjord	1991	8550	J	17
Denmark	Fynske Soer	1995	8225	J	17
Denmark	Tystrup-Bavelse So	1999	8150	J	17
Denmark	Skaelskor + Borreby	1993	7500	J	17
Denmark	Sandbjerg Soer + Grasten	1998	6200	J	17
Denmark	Helnes Bugt	1992	6010	J	17
Denmark	Nakskov Inderfjord	1995	5500	J	17
France	Cours Du Rhin (67 / 68)	1990	28931	J	17
France	Bassin Du Leman	1993	19823	J	17
France	La Camargue	1991	8100	J	17
France	Haut Rhône (01 / 73 / 74)	2002	7266	J	17
France	Complexe De L'Etang De Berre	1998	6309	J	17
Georgia	Black Sea Coast: Ureki – Poti		7150	J	17
Germ./Switz./Aust.	Bodensee Gesamt	1996	82542	J	17
Germany	Wismar-Hohen Wieschendorfer Huk	1993	50000	J	17
Germany	Donau: Km 2246-2405	1992	25567	J	17
Germany	Großer Plöner See	1995	23660	J	17
Germany	Seehof-Wittower Fähre-Breetzer Bodden	1996	19000	J	17
Germany	Wendisch Langendorf-Barth	2002	12200	J	17
Germany	Rassower Strom Und Wieker Bodden	1994	12097	J	17
Germany	Sehlendorfer Binnensee	1996	11500	J	17
Germany	Usedomer Brücke-Lassan	1992	10890	J	17
Germany	Rhein: Nonnenweier-Kehl	1991	10826	J	17
Germany	Neuendorfer Wiek	1991	10810	J	17
Germany	Stralsund-Barhöft	2000	10391	J	17
Germany	Salzhaff	2002	10150	J	17

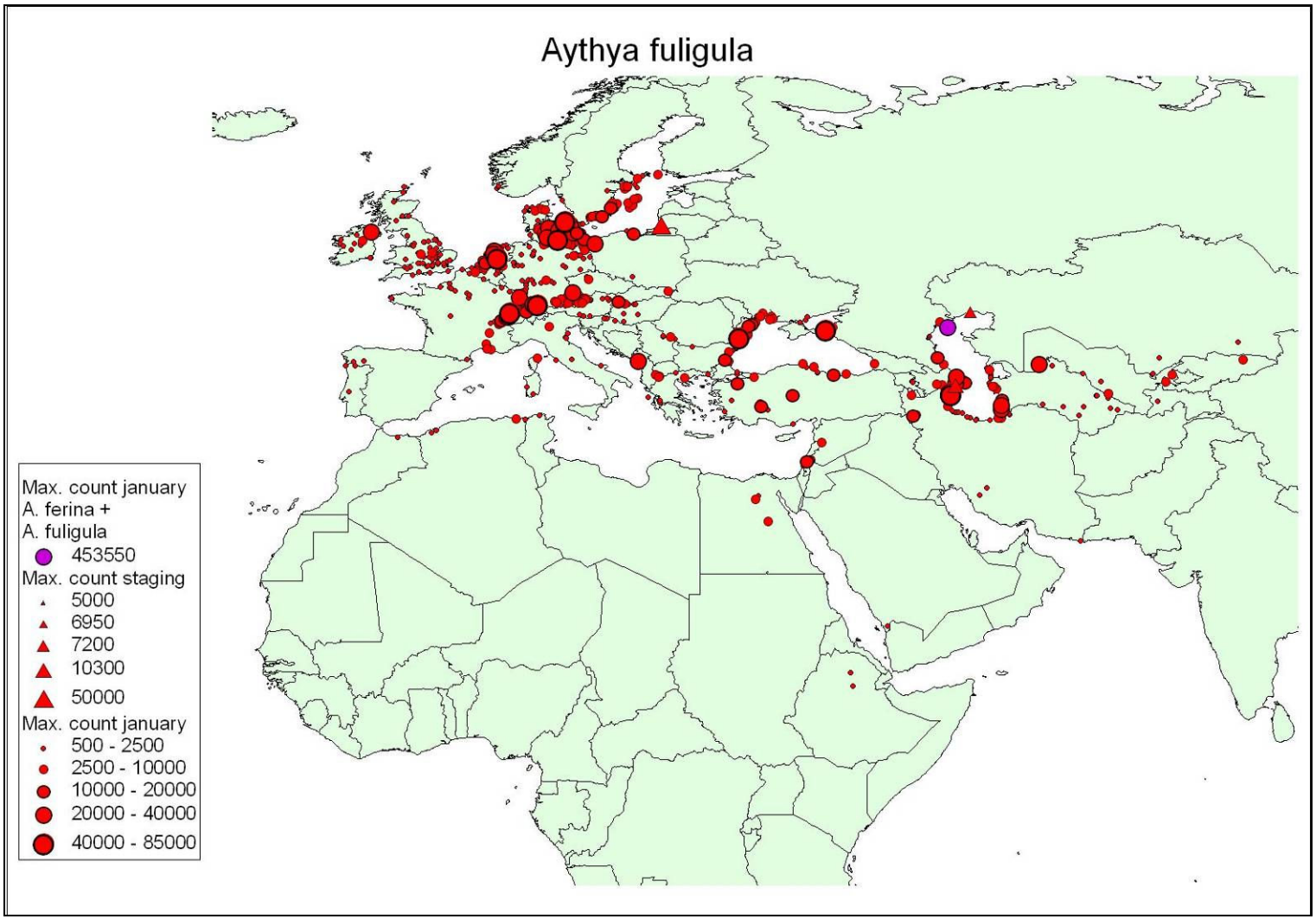


Figure 2.47: Tufted Duck *Aythya fuligula*: Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 500 or more have been recorded.

Table 2.38 continued: Tufted Duck *Aythya fuligula*

Country	Sitename	Year	Count	Type	Ref.
Germany	Brodtener Ufer: Niendorf-Travemünde	1996	9960	J	17
Germany	Strahlbrode-Stralsund	1992	9272	J	17
Germany	Schweriner See Außensee (W)	2001	9160	J	17
Germany	Unterwarnow Und Breitling	1993	9100	J	17
Germany	Rhein: Breisach – Nonnenweier	1990	8700	J	17
Germany	Starnberger See	1996	8682	J	17
Germany	Prora-Saßnitz	1993	8586	J	17
Germany	Einzugsgebiet Ammer: Ammersee	1991	8310	J	17
Germany	Königsstuhl-Glowe	1996	8200	J	17
Germany	Ostbucht Des Fehmarnsundes: Sundbrücke-Großenbroder Kai	1997	8109	J	17
Germany	Schlei: Maasholm-Kappeln	1996	7250	J	17
Germany	Rhein Bei Wiesbaden-Amöneburg (Rhein-Km 501.3-502;5)	1995	7176	J	17
Germany	Neustädter Bucht: Neustadt-Scharbeutz	2002	6800	J	17
Germany	Rhein: Weil-Breisach	2002	6537	J	17
Germany	Küste Der Probstei: Laboe-Bottsand	2002	6500	J	17
Germany	Meiningen-Neuendorf	1991	6350	J	17
Germany	Ost- Und Südostküste Fehmarns: Puttgarden-Staberhuk	1997	6123	J	17
Germany	Greifswalder Bodden: Neu Reddewitz-Klein Zicker	2000	6050	J	17
Germany	Plauer See	1990	6000	J	17
Germany	Großer Jasmunder Bodden (E): Lietzow - Sagard - Spyckerscher & Mi	1991	5824	J	17
Germany	Insel Hiddensee (O)	1995	5781	J	17
Germany	Westensee	1992	5650	J	17
Germany	Ostbucht Des Fehmarnsundes: Burger Binnensee	1996	5450	J	17
Germany	Traveförde: Priwall (Pötenitzer Wiek)	2002	5250	J	17
Germany	Traveförde: Dassower See	1993	5176	J	17
Germany	Schweriner See (SW)	2002	5140	J	17
Germany	Meiningen-Pramort	1994	5120	J	17
Germany	Boddengewässer Waase - Gingst – Seehof	1995	5000	J	17
Germany	Saßnitz-Königsstuhl	1997	5000	J	17
Greece	Lakes Mikri And Megali Prespa (Greek Part)	1995	7008	J	17
Greece	Volvi	1990	5490	J	17
Iran	Urmiyeh (Uromiyeh) Lake:: Total	1997	16744	J	17
Iran	Caspian Coast (Gilan): Anzali- Astara	1998	5327	J	17
Iran	Miankaleh W.R. & Gorgan Bay: Miankaleh Protected Region	2003	5050	J	17
Israel	Valley Of Yesreel	2000	10478	J	17
Kazakhstan	North Caspian Coast total	2003	7200	S	17+23
Macedonia	Lake Prespa (Greek Part)	1990	5500	J	17
Netherlands	Markermeer	2000	28745	J	17
Netherlands	Ijsselmeer	1992	28734	J	17
Netherlands	Gooimeer	1995	15235	J	17
Netherlands	Waterland	1990	15068	J	17
Netherlands	Ketelmeer	1995	12370	J	17
Netherlands	Hollands Diep	1996	11072	J	17
Netherlands	Biesbosch	1996	10366	J	17
Netherlands	Haringvliet	2001	9630	J	17
Netherlands	Fluessen En Heegermeer	2000	9076	J	17
Netherlands	Wolderwijd	2000	8143	J	17
Netherlands	Nieuwe Waterweg / Calandkanaal	1997	7349	J	17

Table 2.38 continued: Tufted Duck *Aythya fuligula*

Country	Sitename	Year	Count	Type	Ref.
Netherlands	Veluwemeer	2000	6955	J	17
Netherlands	Volkerakmeer	1996	6941	J	17
Netherlands	Eemmeer. Nijkerkernauw En Nuldernauw	2001	5935	J	17
Netherlands	Gelderse / Brabantse Maas	1996	5291	J	17
Netherlands	Noordzeekanaal	2002	5054	J	17
Poland	Jez. Dabie	1993	33275	J	17
Poland	Zat. Gdanska	1996	17898	J	17
Poland	Zalew Szczecinski	1993	8890	J	17
Poland	Wisla: Ujscie (Mouth)	1994	7122	J	17
Romania	Chituc (Vadu-Periboina)	1993	80000	J	17
Romania	Gr. Buhazu (Vadu)	1997	10600	J	17
Romania	Periteasca-Portita (244402911 + 244402912)	1990	8000	J	17
Romania	Gura Portitei-Gr.Periboina	1997	6650	J	17
Romania	N. Eforie-S. Eforie	1997	6200	J	17
Romania	Black Sea Coast. 12 Sîtes(30 Km)	1996	5810	J	17
Romania	Delta Dunarii (Danube Delta)	1994	5468	J	17
Romania	Portile De Fier Reservoir (Romanian Part)	1998	5076	J	17
Romania	Mamaia	1997	5000	J	17
Russia	Kiziltashsky Liman Complex		47218	J	17
Russia	Caspian Sea: Manas Sea-shore		11542	J	17
Russia	Sea of Azov: Tamansky Bay		11515	J	17
Russia	Caspian Sea: Derbent Sea-shore		10000	J	17
Russia	Volga Delta	1991	7100	J	17
Russia	Neman River delta		50000	S	35
Russia	Kyzlyar Bay		5000	S	7
Slovakia	Hrusov Dam From Dunaj'S Mouth To Cunovo	1999	11618	J	17
Sweden	Väderön.35	1994	10500	J	17
Sweden	S. Knösö153	2000	10050	J	17
Sweden	Tromtöviken.102	1998	9750	J	17
Sweden	Almöfjärden.99	2001	8445	J	17
Sweden	Storgrundet.325	1991	8000	J	17
Sweden	Äspö.293	1997	7500	J	17
Sweden	Muskö: Åsvik.15	2002	7400	J	17
Sweden	I. Grankullavik.28	2002	7200	J	17
Sweden	Elleholm.3	1996	7000	J	17
Sweden	Östra Himmerfjärden.	1994	7000	J	17
Sweden	S. Torö.8	1996	7000	J	17
Sweden	Rosenholmsviken.97	2000	6900	J	17
Sweden	Järnaviks Hamn.66	1997	6690	J	17
Sweden	Falsterbo Kanal.16	2002	6200	J	17
Sweden	Karlskrona.9	2001	6090	J	17
Sweden	Fittjö-Saltvik.305	1996	6000	J	17
Sweden	Inre Kapellhamnsviken.5	1996	6000	J	17
Sweden	Klintehamnsviken.8	2000	6000	J	17
Sweden	Nötefjärden.321	1998	6000	J	17
Sweden	Y. Grankullavik.27	1998	6000	J	17
Sweden	N. Drag.97	1994	5400	J	17
Sweden	Aspan.107	1996	5035	J	17
Sweden	N. Kvalmsö.94	1993	5030	J	17

Table 2.38 continued: Tufted Duck *Aythya fuligula*

Country	Sitename	Year	Count	Type	Ref.
Sweden	Kapellskär.37	1997	5000	J	17
Sweden	Nynäshamn.9	1996	5000	J	17
Sweden	V. Torö.	1997	5000	J	17
Switzerland	Lac De Neuchâtel	1994	58912	J	17
Switzerland	Lac Léman-Ch	1990	37032	J	17
Switzerland	Rhône: En Aval De Genève	2002	14910	J	17
Switzerland	Vierwaldstättersee	1994	12388	J	17
Switzerland	Hochrhein: Rheinklingen-Aaremündung	1993	12227	J	17
Switzerland	Bielersee	1996	8868	J	17
Switzerland	Zürichsee	1994	7833	J	17
Switzerland	Hochrhein: Aaremündung-Basel	1993	6052	J	17
Syria	Qattine	1995	10000	J	17
Turkey	Hirfanli Baraji	1996	14550	J	17
Turkey	Uluabat Golu (Apolyont Golu)	1996	13600	J	17
Turkey	Egridir Golu	1999	12470	J	17
Turkey	Giresun-Ünye Black Sea	1997	10775	J	17
Turkey	Hoyran Golu	1990	9920	J	17
Turkey	Sapanca Golu	1995	5670	J	17
Turkmenistan	Lake Sarykamysh	2003	22190	J	17
Turkmenistan	Caspian Coast: Keymir Shore	2004	22000	J	17
Turkmenistan	Caspian Coast: Guyjuk-Okarem	1998	21220	J	17
Turkmenistan	Caspian Coast: Okarem-Cheleken	1998	17317	J	17
Turkmenistan	Caspian Coast: Guyjuk Shore	2004	15000	J	17
Turkmenistan	Caspian Coast: Chikishlyar Shore	2004	10132	J	17
Turkmenistan	Krasnovodsk & North-Cheleken Bays	1991	6820	J	17
Ukraine	Sasyk Liman + Adjacent Sea Area	2000	20000	J	17
Ukraine	Dzansheisky. Shagany; Alibey; Burnas Limans	1995	14000	J	17
Ukraine	Budaksky Liman	2000	10000	J	17
Ukraine	Unknown	1993	10000	J	17
Ukraine	Area Northeast Of Odessa	1998	7000	J	17
Ukraine	Black Sea State Biosphere Reserve	1990	5300	J	17
United Kingdom	Loughs Neagh & Beg	1996	25340	J	17
Uzbekistan	Tuyabuguz Reservoir	2004	7016	J	17
Yugoslavia	Skadarsko Jezero	1993	40000	J	17

2.21.2 Tufted Duck movements

The Tufted Duck breeds across northern Eurasia from Iceland to the Bering Sea, between 45°N and 70°N. A large proportion (probably more than 60%) breed in Russia (600,000 to 800,000 pairs) and neighbouring Fennoscandia (147,000 to 220,000 breeding pairs). It is mainly migratory, but some populations in Europe are resident or perform only short-distance movements. Wintering areas are found in northwestern and south Europe, around the Caspian and Black Seas, northern Africa and across Asia to Japan in the east.

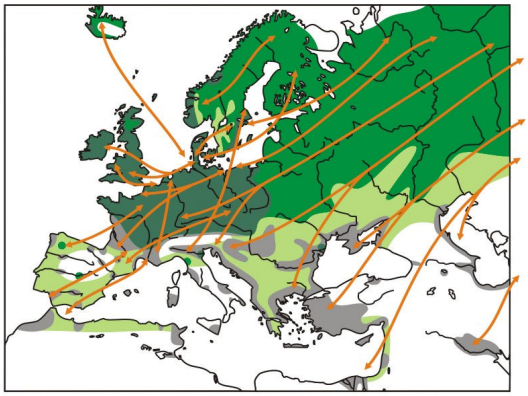


Figure 2.48: Map depicting the movements of Tufted Duck (*Aythya fuligula*) based on published information and ring recoveries in the EURING Data Bank.

The ringing of Tufted Ducks in Europe has not been widespread and the largest numbers of recoveries available are from Britain, Switzerland and Denmark. During December – February recoveries are concentrated in west and central Europe, including the southern and western part of the Baltic. A decrease in recoveries from Iberia and SW France is recorded between January and February, with a tendency which becomes more intense between February and March. The most intense phases of return migration take place mainly during April and May. Recoveries during the breeding season (May – June) are spread out in northern Europe and eastward to the River Ob, east of the Urals, at about 70°E. Some recoveries are also found during the breeding season in west and central Europe as well as in Iceland. Autumn migration continues until October and most Tufted Ducks have left the Russian breeding areas by November.

Tufted Ducks are broad front migrants. Birds breeding in Fennoscandia, the Baltic States and northwest Russia migrate to the Baltic and western and central Europe, a few also to southwestern Europe. Central Russian and western Siberian populations migrate to central and eastern Europe, the Black Sea, east Mediterranean and Caspian Seas. Birds breeding in Siberia and in the eastern part of the breeding range winter in the Caspian region, Pakistan, northern India, and southeast China to Japan.

Male Tufted Ducks from the east of the range begin arriving in western Europe to moult shortly after breeding and return quickly after moulting. A second-year male ringed at Abberton Reservoir, Essex, on 28 May 1969 was shot on 14 April 1971 in Pakistan (6,153km). Such a record is probably not exceptional, and is almost certainly an example of moult migration. Of 54 adult birds ringed at Abberton in the period May-July and subsequently found in the same period, 50 were males. Of these, 34 were later found in Russia, with seven in Finland and only six found in Britain.

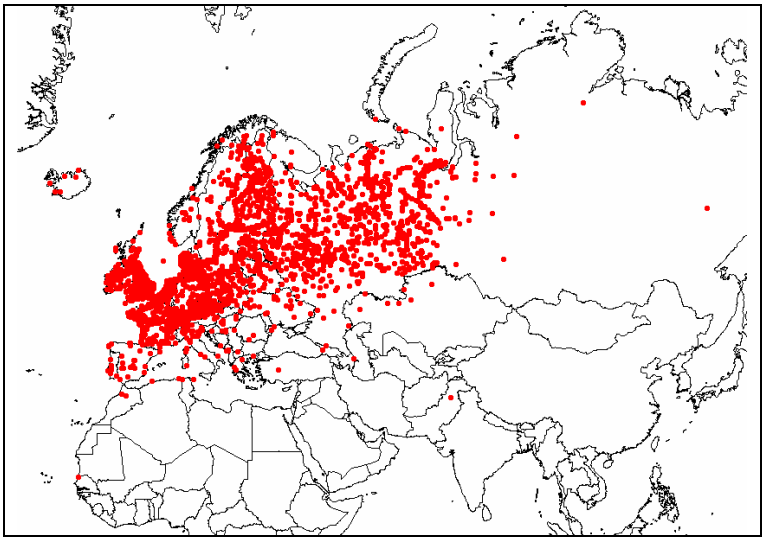
Table 2.39: Summary of the movements of Tufted Duck (*Aythya fuligula*) from the literature based on published information and ring recoveries in the EURING Data Bank.

Tufted Duck *Aythya fuligula*

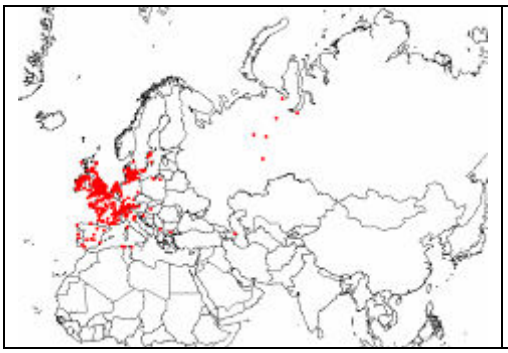
Distribution: Palaearctic, across northern Eurasia from Iceland to the Bering Sea, between 45°N and 70°N. No discrete breeding populations defined but more separation in wintering areas: NW Europe (centred on the Baltic), central European lakes, the Black Sea, the Sea of Azov and the Caspian Sea. Continuous distribution from central Europe through the Danube in Hungary to the Black Sea region

Moult: males end of June-Sep, female while breeding

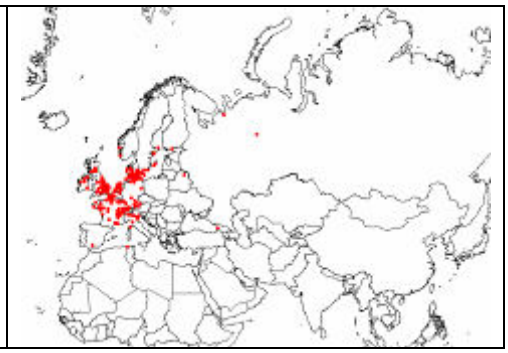
Population (or part of population)	Autumn Migration		Wintering / Non-breeding Grounds		Spring Migration		References
	direction / via	during	location	during	direction / via	during	
Western Eurasian populations			south to North Africa and the Gulf, few in West and East Africa				8
W-Europe			(mainly sedentary)				8
Iceland			Denmark, Netherlands, Great Britain			Mar-Apr	2, 5
Fennoscandia, Baltic region, Russia east to 65°E, Poland, Denmark			Baltic, around North Sea and Atlantic coasts, Norway, Belgium, Denmark, Netherlands, Great Britain, Ireland, France, Spain, Portugal, Italy, SE-Denmark, archipelagos of eastern Sweden	Nov			2, 3, 4, 5, 6, 7, 8, 9, 12
Sweden	Sweden, Denmark		Denmark, Netherlands, Belgium, France, Great Britain, Ireland, N-Mediterranean				1, 4
NW European population	in mild winters		Baltics, northeast coast of Germany, W-Poland, Switzerland, Netherlands				2, 3, 8
Britain and Ireland			NW-France, Netherlands, Denmark		abmigration to Scandinavia and Russia		1, 3
Belgium, Netherlands			France, Netherlands, Great Britain, NW-Africa, Spain, Austria, Italy				1, 7, 12
Central Europe, Germany			Netherlands, Great Britain, Ireland and further SW through Mid Europe; few Baltic birds stay in the Baltics				1
NE of European Russia, NW-Siberia	Danube Delta in Romania, Ob River Russia		Central Europe, Baltic Sea, Black Sea, east Mediterranean, Caspian coast of Iran				1, 3, 8, 11
Czech Republic			Switzerland, Germany, as far as Spain				13
W-Siberia, Central Asia, Eastern part of breeding sites	Volga Delta, SW		Caspian Region, as far as Egypt, Pakistan, Northern India, southeast China to Japan, Italy				1, 3, 8, 11, 12
birds usually wintering in the Baltics	in cold winters move to		Netherlands, Britain, Ireland				8



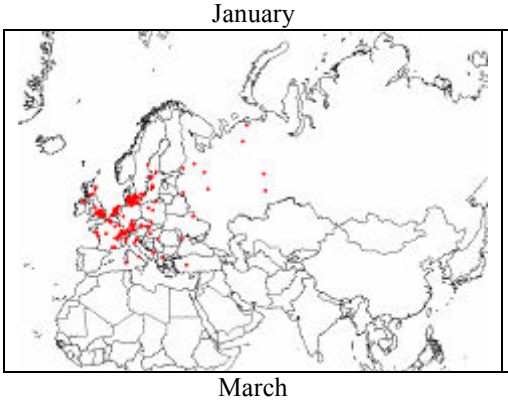
Finding locations of all dead birds



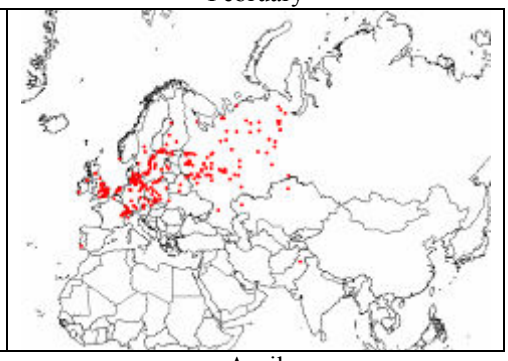
January



February



March



April

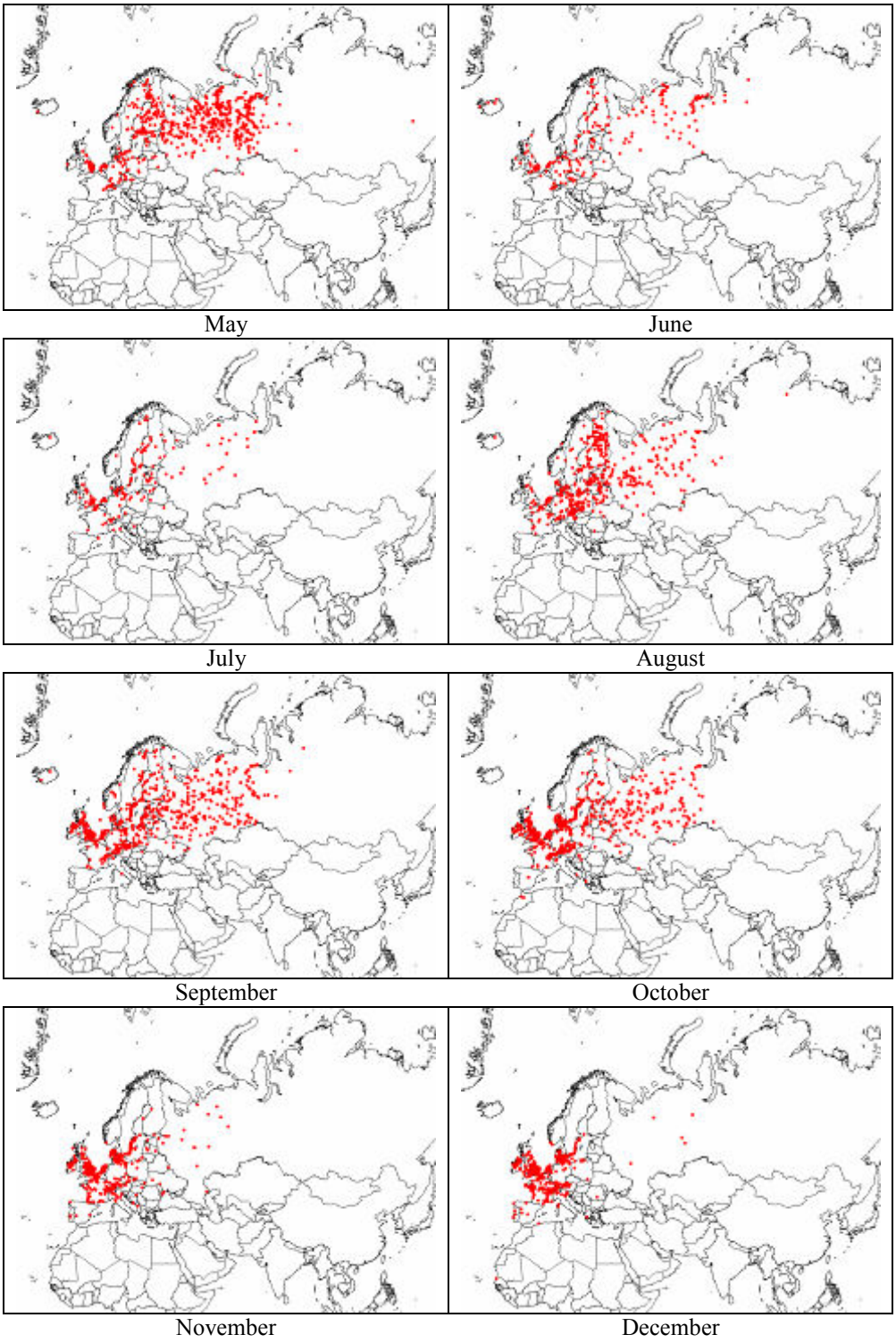


Figure 2.49: Finding locations of all Tufted Duck (*Aythya fuligula*) in the EURING data bank. All birds are presented and also broken down by month.

2.22 Northern Lapwing (*Vanellus vanellus*)

2.22.1 Numbers and Distribution

Northern Lapwings concentrate outside the breeding season in Ireland, the UK, France and The Netherlands (Figure 2.50). Important numbers also winter further south in Iberia, Italy, Albania and Greece, especially in hard winters. The Caspian coast of Iran and Azerbaijan, and a number of sites in Iran and along the south and east Mediterranean coast are less important wintering areas.

Peak January counts of Northern Lapwing exceeding 5,000 birds have been made at 37 sites in The UK, 33 in France, 20 in Ireland, 11 in Spain, 10 in The Netherlands, four in Italy, two each in Russia, Albania and Iran, and at single sites in Greece and Azerbaijan (Table 2.40). The highest counts were recorded at The Somerset Levels, UK, where 78,762 were counted in 1995, and at the Etangs De La Brenne, France, where 71,500 were counted in 2001. Additional sites in The UK where between 23,000 and 36,000 have been recorded are The Wash, Breydon Water and Berney Marshes, Humber Estuary, Arun Valley, Ribble Estuary, Morecambe Bay, and Thames Estuary. Equivalent sites in France where between 21,000 and 43,000 have been counted were La Camargue, Marais Poitevin, Loire Amont, Etangs Argenton – Chateau, Sud Loire and Estuaire Seine. The highest count in Ireland, at the Shannon and Fergus Estuary in 1995 was 27,924, and in Spain at the Riá De Villaviciosa in 1997 was 16,075.

Table 2.40: Nothern Lapwing *Vanellus vanellus*: Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 5,000 or more have been recorded.

Country	Sitename	Year	Count	Type	Ref.
Albania	Karavasta Complex	1997	10579	J	17
Albania	Narta Complex	2001	9376	J	17
Azerbaijan	Caspian Coast: Gyzylagach Nature Reserve		5307	J	17
France	Etangs De La Brenne	2001	71500	J	17
France	La Camargue	1994	43625	J	17
France	Marais Poitevin	1998	40550	J	17
France	Loire Amont	2000	29500	J	17
France	Etangs Dans Region Argenton-Château	2004	23700	J	17
France	Sud-Loire	1996	21360	J	17
France	Estuaire Seine	1998	21348	J	17
France	Rétenue Du Cebron	1998	19500	J	17
France	Etangs Du Montmorillonnais (4)	1992	19292	J	17
France	Lacs: Orient. Amance Et Temple-Auzon	1998	18000	J	17
France	Etangs Du Nord Loire Atlantique	1998	17016	J	17
France	Loire: De Beaugency A Chaumont / Loire	1998	14850	J	17
France	Presqu'Ile Guérandaise Dont Traicts Du Croisic	1998	12890	J	17
France	Etangs De La Region Centre	1998	12000	J	17
France	Lac De Rille	1995	11000	J	17
France	Communal Du Poire Sur Velluire	1996	10000	J	17
France	Vallée De L'Oise: De Compiegne A 95	2004	9354	J	17
France	Etangs Nord Dans Region De Bressuire	2004	8995	J	17
France	Baie Des Veys	2001	8731	J	17
France	Résèrve Naturelle De Moeze (Charente-Seudre)	1998	8544	J	17

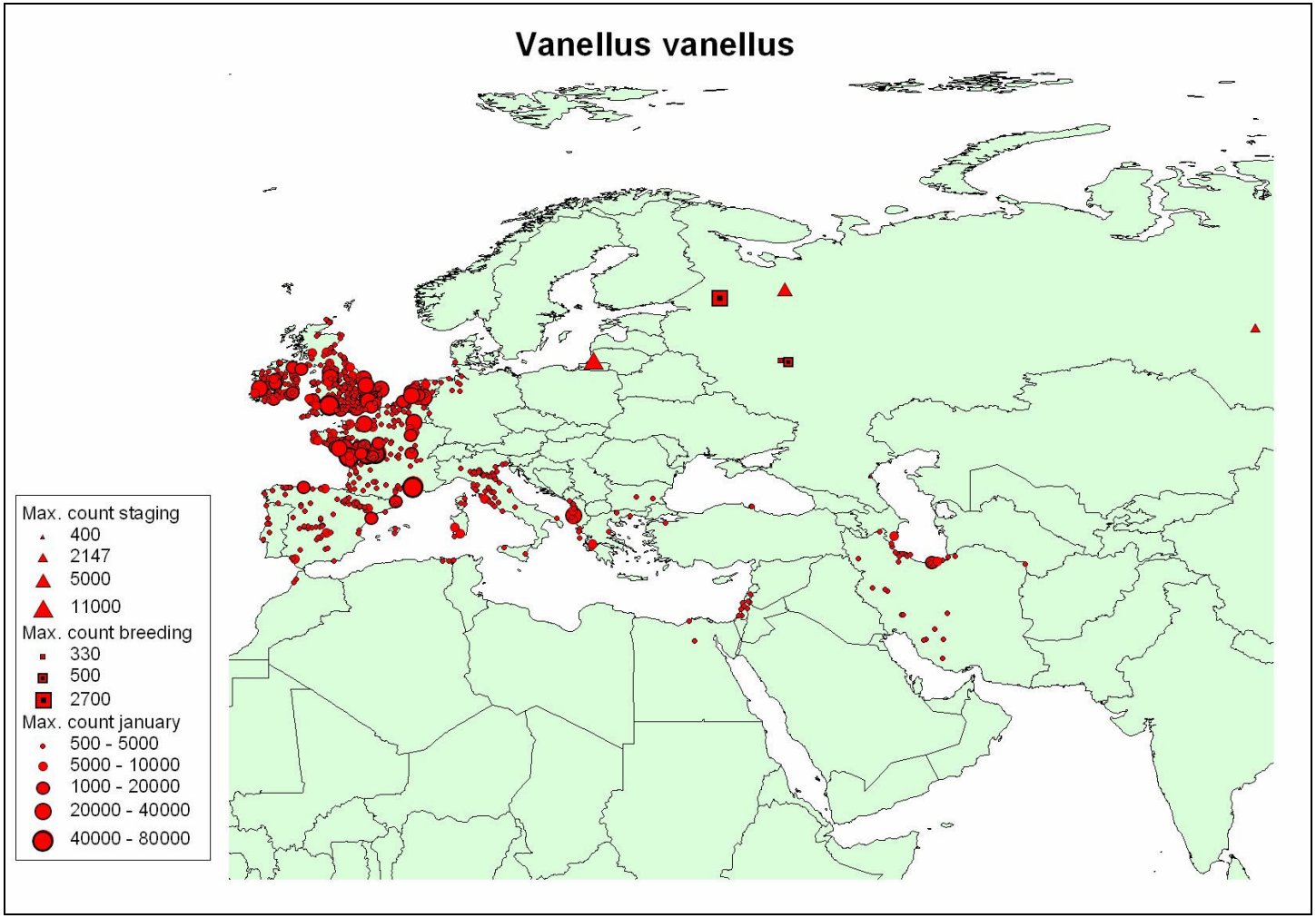


Figure 2.50: Northern Lapwing *Vanellus vanellus*. Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 500 or more have been recorded.

Table 2.40 continued: Nothern Lapwing *Vanellus vanellus*

Country	Sitename	Year	Count	Type	Ref.
France	Résèrve Naturelle De St. Denis Du Payre	1996	8000	J	17
France	Baie De St-Brieuc-Yffiniac-Morieux	1996	8000	J	17
France	Baie De Douarnenez	1990	7800	J	17
France	Loire: De Beaulieu A Beaugency	2004	7398	J	17
France	Rivière De Pont L'Abbé	1996	7000	J	17
France	Loire Aval	1998	6235	J	17
France	Golfe Du Morbihan	1996	6106	J	17
France	Lac De Puydarrieux	2003	6000	J	17
France	Marais Breton	2003	5767	J	17
France	Baie D'Audierne	1998	5550	J	17
France	Etangs De Sologne	1996	5511	J	17
France	Lac Du Der-Chantecoq (51 / 52)	1998	5310	J	17
France	Marais Cotiers De Vendée	2001	5000	J	17
France	Etang De Paintourteau	1992	5000	J	17
Greece	Messolonghi Lagoon (From River Evinos To River Acheloos)	1998	6938	J	17
Iran	Fereydoon Kenar, Ezbaran & Sorkh Rud Damgahs:	1998	16000	J	17
Iran	Sayed Mahali & Zarinkola Ab: Zarinkola Ab-Bandan	1998	8000	J	17
Ireland	Shannon And Fergus Estuary	1995	27924	J	17
Ireland	Wexford Harbour And Slobs	1997	16655	J	17
Ireland	Shannon Callows	1995	15400	J	17
Ireland	Cork Harbour	1995	15204	J	17
Ireland	The Cull And Killag	1997	15000	J	17
Ireland	Lough Ree	1998	10535	J	17
Ireland	Little Brosna Callows	1993	8500	J	17
Ireland	Dundalk Bay: Soldiers Point	1994	8112	J	17
Ireland	Blackwater Estuary	1997	7824	J	17
Ireland	Boyne Estuary	1996	7500	J	17
Ireland	Southern Roscommon Lakes	1997	7052	J	17
Ireland	Tralee Bay. Lough Gill & Akeragh	1997	6960	J	17
Ireland	Inner Galway Bay	1997	6945	J	17
Ireland	Cahore Marshes	1996	6800	J	17
Ireland	Dundalk Bay	2002	6435	J	17
Ireland	Ballymacoda	1997	6100	J	17
Ireland	Tramore Back Strand & Bay	1997	6000	J	17
Ireland	Outer And Inner Rogerstown Estuary	1994	5778	J	17
Ireland	Tacumshin Lake	1995	5660	J	17
Ireland	Dungarvan Harbour	1997	5420	J	17
Italy	Oristano	1997	6747	J	17
Italy	Orbetello E Burano	1998	5733	J	17
Italy	Stagno Di Cagliari	1998	5363	J	17
Italy	Laghi Di Mantova	1998	5000	J	17
Netherlands	Gelderland. Except Rivers Rhine; Waal; Maas; And Ijssel	1994	23708	J	17
Netherlands	Beneden Rivièrengebied / Zoete Delta	2000	15646	J	17
Netherlands	Noord-Holland. Except Coast	2000	11744	J	17
Netherlands	Utrecht. Except River Rhine	2000	10700	J	17
Netherlands	Friesland. Except Coast	1994	8352	J	17
Netherlands	Westerschelde	2000	6612	J	17
Netherlands	Noord Brabant	2000	6541	J	17
Netherlands	Veerse Meer	1995	6453	J	17
Netherlands	Afsluitdijk-Balgzand (Meltofte 29)	1995	5224	J	17

Table 2.40 continued: Nothern Lapwing *Vanellus vanellus*

Country	Sitename	Year	Count	Type	Ref.
Netherlands	Flevoland (Excluding Separation Lakes)	2000	5084	J	17
Russia	Neman River delta		11000	S	35
Russia	Kargapol area		5000	S	24
Spain	Ría De Villaviciosa (O)	1997	16075	J	17
Spain	Aiguamolls De L'emporda (Gi)	2001	15320	J	17
Spain	Delta Del Ebro (T)	2001	13579	J	17
Spain	Lucios De Beta La Palma-Isla Mayor (Se)	2000	8446	J	17
Spain	Río Arakil. Villanueva-Asiaín (Na)	2003	8437	J	17
Spain	Arrosars Alcarràs (Ll)	1998	7500	J	17
Spain	Marismas De Santoña (S)	1997	7035	J	17
Spain	Arrozales De La Violada-N. Monegros (Hu)	1997	6760	J	17
Spain	Baix Ter-Pals (Gi)	2003	5466	J	17
Spain	Desagües De Alcázar En Vegas Del Cigüela (Cr)	1997	5222	J	17
Spain	Bahía De Santander (S)	1997	5000	J	17
United Kingdom	Somerset Levels	1995	78762	J	17
United Kingdom	The Wash	2003	36232	J	17
United Kingdom	Breydon Water & Berney Marshes	1994	32000	J	17
United Kingdom	Humber Estuary	1990	30892	J	17
United Kingdom	Arun Valley	1995	29863	J	17
United Kingdom	Ribble Estuary	1992	26552	J	17
United Kingdom	Morecambe Bay	1990	24171	J	17
United Kingdom	Thames Estuary	1998	23475	J	17
United Kingdom	Blackwater Estuary	1998	19377	J	17
United Kingdom	Walland Marsh	1999	19000	J	17
United Kingdom	Carmarthen Bay	1995	16873	J	17
United Kingdom	Swale Estuary	1999	16241	J	17
United Kingdom	Severn Estuary (English Counties)	1995	16025	J	17
United Kingdom	Strangford Lough	1997	13547	J	17
United Kingdom	Colne Estuary	1998	12440	J	17
United Kingdom	Mersey Estuary	1992	12400	J	17
United Kingdom	Hamford Water And Naze Combined	1994	11635	J	17
United Kingdom	Loughs Neagh & Beg	2000	10968	J	17
United Kingdom	Medway Estuary	1998	10940	J	17
United Kingdom	Poole Harbour	1994	10454	J	17
United Kingdom	Crouch-Roach Estuary	1994	9970	J	17
United Kingdom	Welsh Dee	1995	8485	J	17
United Kingdom	Solway Estuary (English Counties)	1992	8420	J	17
United Kingdom	Nene Washes	1998	8100	J	17
United Kingdom	North Norfolk Coast	1990	7922	J	17
United Kingdom	Alde Complex	1999	7558	J	17
United Kingdom	Lower Derwent Ings	1998	6700	J	17
United Kingdom	Rye Harbour & Pett Level	1995	6364	J	17
United Kingdom	Thanet Coast	1994	6050	J	17
United Kingdom	Pegwell Bay	1994	6020	J	17
United Kingdom	Taw-Torridge Estuary	2000	5895	J	17
United Kingdom	Tees Estuary	1990	5775	J	17
United Kingdom	Forth Estuary	1992	5657	J	17
United Kingdom	Ouse Washes	2002	5588	J	17
United Kingdom	Inner Firth Of Clyde	1993	5570	J	17
United Kingdom	Cleddau Estuary	1995	5405	J	17
United Kingdom	St Benet'S Levels	1996	5000	J	17

2.22.2 Northern Lapwing movements

The Lapwing breeds in a large part of Europe and in a band across Asia to eastern China. The species is migratory in most of its breeding range, except western and southwestern Europe and Turkey. It seems to avoid areas where the winter temperature falls below zero.

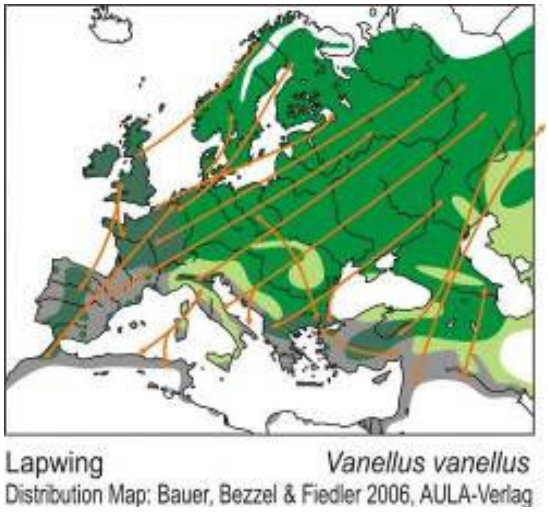


Figure 2.51: Map depicting the movements of Northern Lapwing (*Vanellus vanellus*) based on published information and ring recoveries in the EURING Data Bank.

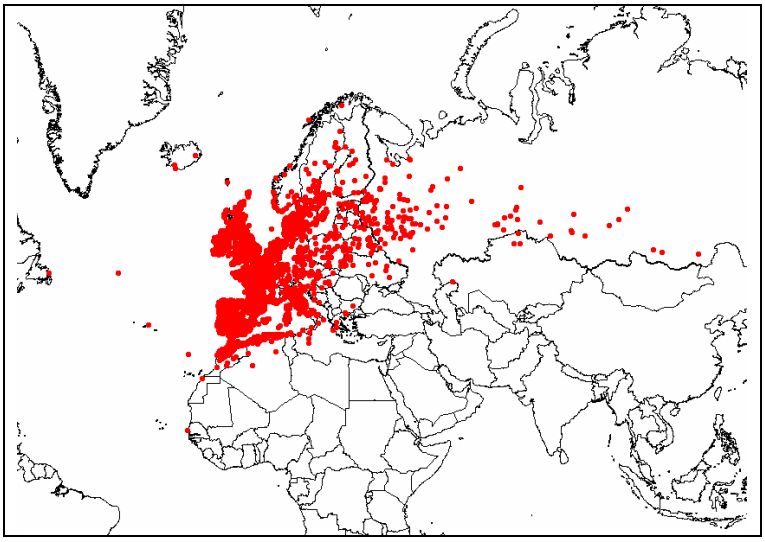
Large numbers of recoveries are available from birds ringed in the Netherlands, Britain, Belgium and Sweden. Recoveries reported during the period December to February are strongly concentrated in western and southwestern Europe as well as in northwestern Africa. A decrease in North African recoveries takes place between January and February. The distribution of recoveries in March shows further and stronger movements out of North Africa and Iberia, and a higher concentration of recoveries in Italy. While disappearing from North Africa, in March recoveries appear also in eastern Europe and southern Scandinavia. In April recoveries are reported further north and east and fewer recoveries are reported in France, Spain and Italy during this month. Recoveries during the period May and June are spread out in central and northern Europe and a few are also reported eastwards to Siberia and Kazakhstan. In this period large numbers of recoveries are also found in Britain, northern France, Belgium, The Netherlands, Germany and Denmark and they can be a result of summer movements of adult birds directed westward from central and eastern Europe. The autumn migration starts late and the number of recoveries in southwestern Europe and North Africa is still increasing in December. Birds breeding in northern Europe and western Russia migrate SW to western and southwestern Europe and North Africa. Lapwings from breeding areas in western Europe are resident or move south, as far as North Africa. Central European birds winter in western Europe, but also in the Mediterranean. Birds breeding in central Russia and southwest Siberia can move to southwestern Europe, but probably mainly to Turkey, Nile delta and western Asia. Abmigration from western Europe to far east in Russia have been shown from recoveries of birds ringed as chicks. Several recoveries show aberrant movements westwards to islands in the Atlantic as well as to North America.

Table 2.41: Summary of the movements of Northern Lapwing (*Vanellus vanellus*) from the literature based on published information and ring recoveries in the EURING Data Bank.

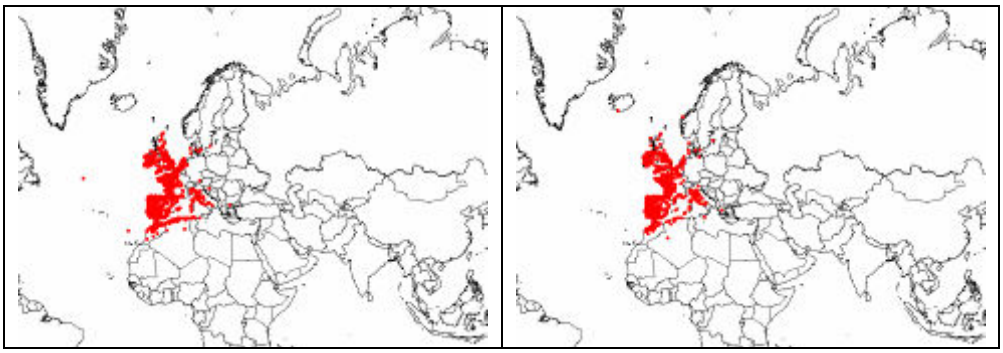
Northern Lapwing ***Vanellus vanellus***

Distribution: whole Eurasia, main wintering area west of 0°C January isotherm. Short distance migrant.

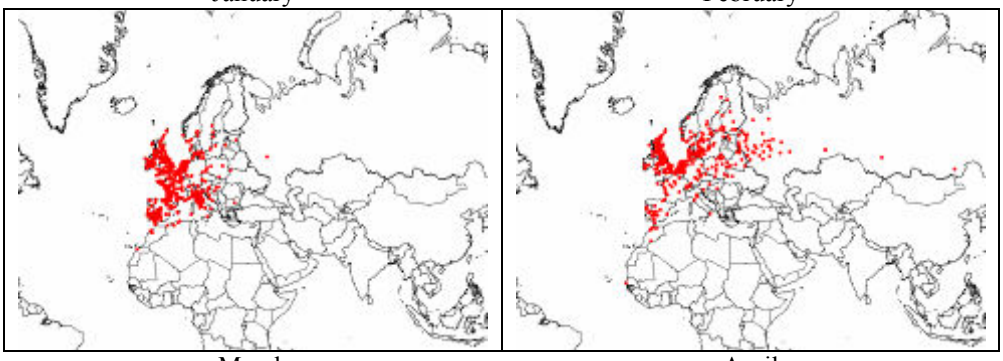
Population (or part of population)	Autumn Migration		Wintering / Non-breeding Grounds		Spring Migration		References
	direction / via	during	location	during	direction / via	during	
Central Europe	W-NW / S-SW		Netherlands, Britain & Ireland / France, Italy, NE-Greece				1, 2, 3, 12
Great Britain, Ireland			France, Spain, as far as N-Africa, Italy				1, 12
Denmark	SW	Sep	Netherlands, Great Britain, France, Spain, N-Africa	Dec-Jan	same route as autumn	Jan-Mar	2, 5
Fennoscandia, Estonia, Latvia, Russia	via Denmark (Aug)	Aug-Oct	Great Britain, Netherlands, Belgium, France, Spain, Italy, Greece, Mediterranean basin, N-Africa, Poland, Germany, few Sweden, Norway, Denmark, Finland, as far as SW-Siberia			Mar-Apr	2, 3, 6, 9, 11, 12
Netherlands			Great Britain, Denmark, Belgium, France, Spain, Italy, Mediterranean islands, N-Africa				2, 12
SW-Siberia	Caspian Sea, Syria, WSW	Oct	France, Spain, as far as N-Africa, Western Europe; lower Nile delta, W-Asia, S- and E-Asia			Mar-Apr	11



Finding locations of all dead birds



January February



March April

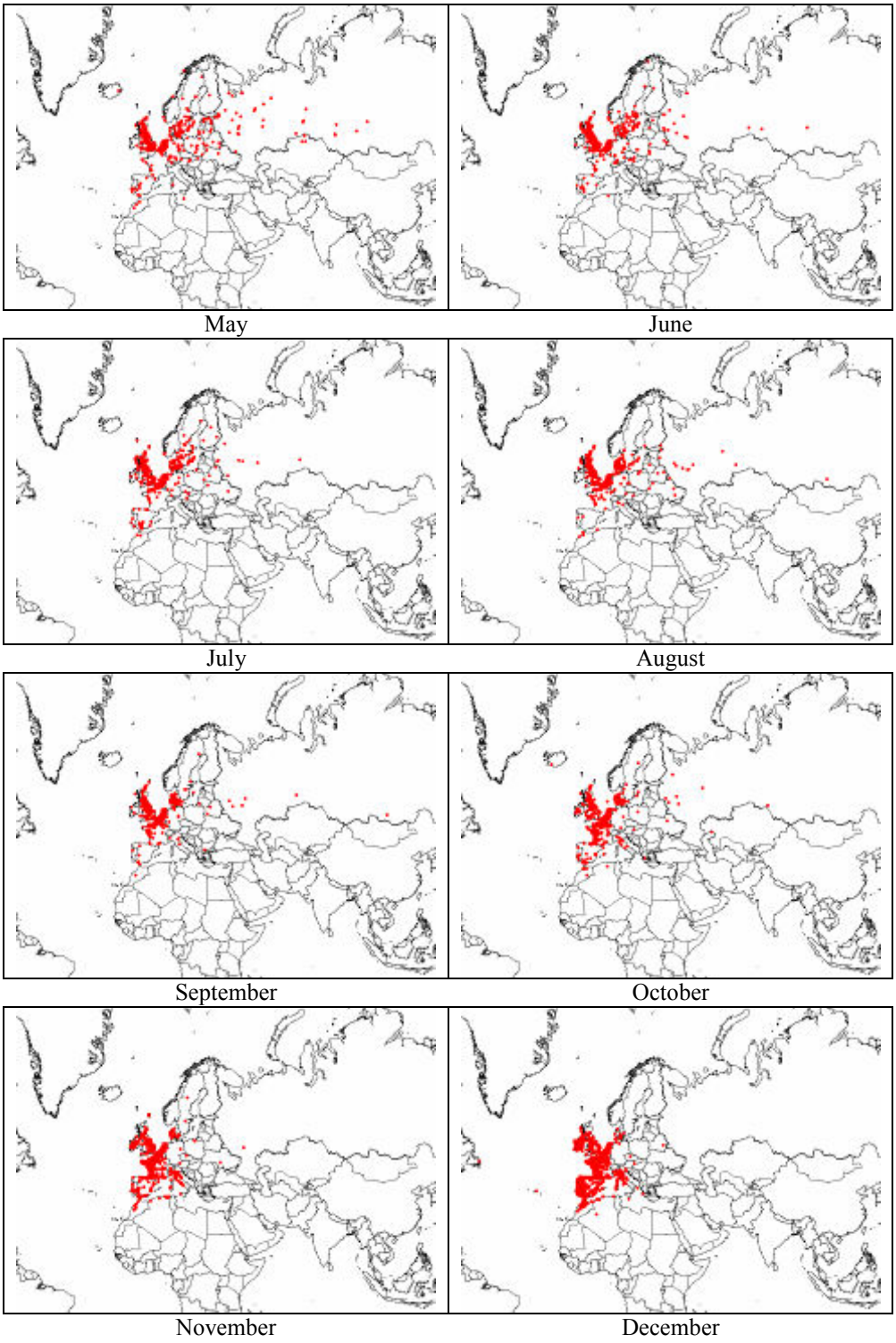


Figure 2.52: Finding locations of all Northern Lapwing (*Vanellus vanellus*) in the EURING data bank. All birds are presented and also broken down by month.

2.23 Black-headed Gull (*Larus ridibundus*)

2.23.1 Numbers and distribution

This is a very numerous species throughout western and southern Europe and it occurs in high numbers deep into central Europe (Figure 2.53). The southeast Mediterranean from Egypt to Israel and the southern Persian Gulf are also important centres of the population in January. A number of concentrations in Central Asia and Iran are less numerous than those found in Europe. Distribution extends to the West African coast of Senegal, and in East Africa to Sudan, Ethiopia, Kenya, and Uganda.

Table 2.42 shows that a total of 33 sites in 11 countries have recorded January peak counts of more than 20,000 Black-headed Gulls. Of these peak counts, 14 were in France and Spain, where the highest was at Gravera Del Porcal, Spain, in 2000, where 96,000 were counted, followed by 80,000 in France at the Etangs Montpellierains in 1999. Other high counts in France included 70,180 at Etangs et Lacs du Bocage Vendéen in 1998, 60,000 at Baie du Mont Sant Michel in 2003, and 38,500 at Baie de Morlaix and Penze in 1997. Other high counts in Spain included 58,287 at Parque Natural de la Albufera in 1993, 55,000 at Embalse de el Vicario in 1990 and 27,000 at Embalse de Santillana in 1998. In Italy, seven sites recorded peak counts in excess of 20,000, the highest being 30,000 at Biviere di Lentini in 2002. In The UK, peak January counts of more than 20,000 Black-headed Gulls were made at four sites, including 50,000 at Tring Reservoirs in 1994, 35,410 in the Thames Estuary in 2001 and 31,300 at Lower Derwent Ings in 1996. Further East, single sites in Georgia and Turkey recorded peak counts within this range, with 40,500 on the Black Sea Coast between Batumi and Kobuleti (Georgia) in 2002, and 30,990 at the Camalti Salt Pans in the Gediz Delta (Turkey) in 1999. In the Middle East, a series of high peak January counts included 64,543 at Lake Manzala, Egypt, in 1990, 40,065 on the Southern Coastal Plain of Israel in 2002, 49,000 at Khor Khan, UAE, in 1991, and 27,747 at Seeb-Qurm, Oman in 1991.

Table 2.42: Common Black-headed Gull *Larus ridibundus*: Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 6,000 or more have been recorded.

Country	Sitename	Year	Count	Type	Ref.
Bahrain	Askar Rubbish Dump	1992	17238	J	17
Belgium	Virelles (Étang)	2000	10000	J	17
Belgium	Obourg (Carrières)	1999	7030	J	17
Egypt	Lake Manzala	1990	64543	J	17
Egypt	Lake Idku	1990	14300	J	17
Egypt	Lake Burullus	1990	13889	J	17
Egypt	Nile Valley Cairo-Aswan(850Km)	1990	8003	J	17
France	Etangs Montpellierains (34+30)	1999	80000	J	17
France	Etangs Et Lacs Du Bocage Vendéen	1998	70180	J	17
France	Baie Du Mont Saint Michel	2003	60000	J	17
France	Baie De Morlaix + Penze	1997	38500	J	17
France	Etang De Châtillon En Vendelais	2002	26000	J	17
France	Lac De Grandlieu	1999	21000	J	17
France	Lacs: Orient. Amance Et Temple-Auzon	1996	21000	J	17
France	Littoral Du Pas De Calais	1995	20040	J	17
France	Presqu'Ile Guérandaise Dont Traicts Du Croisic	1994	19340	J	17

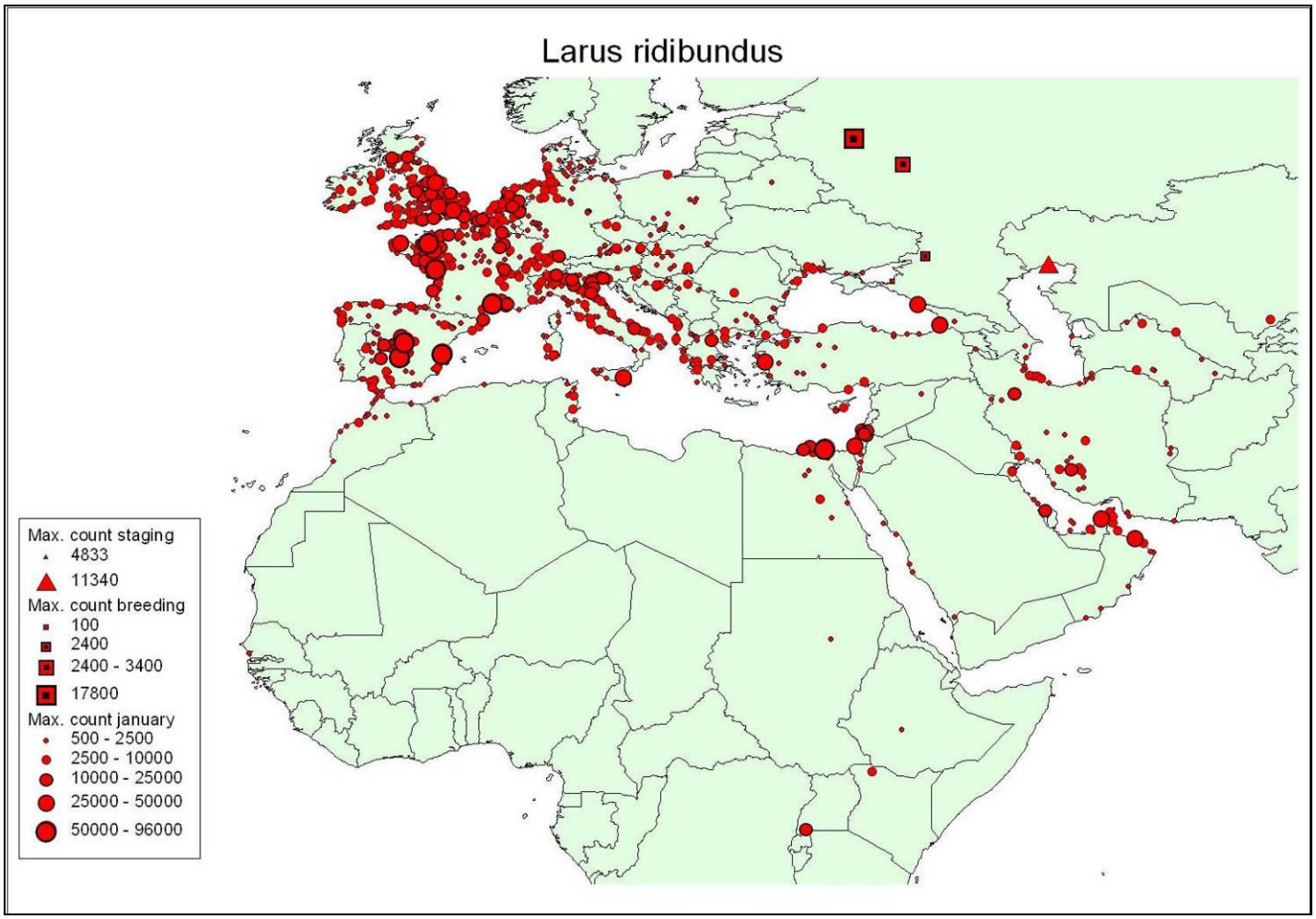


Figure 2.53: Black-headed Gull *Larus ridibundus*. Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 500 or more have been recorded.

Table 2.42 continued: Common Black-headed Gull *Larus ridibundus*

Country	Sitename	Year	Count	Type	Ref.
France	Rance	1997	19000	J	17
France	Etangs Du Nord Loire Atlantique	2001	16177	J	17
France	Lac Du Der-Chantecoq (51 / 52)	1994	15250	J	17
France	Complexe De L'Etang De Berre	2002	13986	J	17
France	Etang De Paintourteau	2003	13930	J	17
France	Flandre Interieure. Region De Lille	1996	13360	J	17
France	Estuaire Seine	2003	12992	J	17
France	Loire Amont	1999	12000	J	17
France	Etangs Est De La Mayènne	2000	11500	J	17
France	Region De Lens Et De Bethune	2001	10661	J	17
France	Saône: D'Allerey A St. Symphorien D'Ancelles	1996	10200	J	17
France	Littoral De Courseulles A Arromanches	1998	10125	J	17
France	Bassin D'Arcachon	2000	10100	J	17
France	Lac Du Verdon	1996	10000	J	17
France	Plan D'Eau De Pont L'Eveque	1994	9530	J	17
France	Etangs De Thau Et De Bagnas	2003	9500	J	17
France	Littoral Picard	1993	9385	J	17
France	Val De Seine De Vernon A Pont De L'Arche	1998	9220	J	17
France	Etang Au Duc De Ploermel	2004	9000	J	17
France	Etangs D'Hede (Nord De Rennes)	2004	9000	J	17
France	Marais D'Olonne	1995	9000	J	17
France	Rétenue Du Cebron	2001	7800	J	17
France	Rade De Brest	2000	7750	J	17
France	Etangs De La Region Centre	2001	7000	J	17
France	Sud-Loire	1994	6923	J	17
France	Plan D'Eau De Saint Cyr	2003	6500	J	17
France	Littoral Dunkerquois	1998	6100	J	17
Georgia	Black Sea Coast: Batumi – Kobuleti		40500	J	17
Germany	Bodensee-Obersee-D	1996	10037	J	17
Germany	Dümmer	1995	6711	J	17
Germany	Alfsee und Haseniederung	1991	6523	J	17
Greece	Axios, Loudias & Aliakmon Deltas	1997	11975	J	17
Greece	Kerkini	1997	10000	J	17
Greece	Amvrakikos Wetlands	1997	7320	J	17
Greece	Volvi	1999	6128	J	17
Iran	Maharloo Lake	2003	13700	J	17
Iran	Persian Gulf Coast (Kuzhestan): Mahshahr Surroundings	1997	10350	J	17
Ireland	Dundalk Bay: Soldiers Point	1994	10000	J	17
Ireland	Dublin Bay: North Bull Island	1994	7000	J	17
Ireland	Wexford Harbour And Slobs: Wexford Harbour	1993	6555	J	17
Israel	Southern Coastal Plain	2002	40065	J	17
Israel	Jezreel Valley	2002	16519	J	17
Israel	Kinnrot Valley	1994	11364	J	17
Israel	North Lower Jordan Valley	2001	10484	J	17
Israel	Galilee Coastal Plain	2002	10099	J	17
Israel	Southern Coastal Plain	1994	9386	J	17
Israel	Central Coastal Plain	1993	6233	J	17
Italy	Biviere Di Lentini	2002	30000	J	17
Italy	Lago Di Garda	1997	23333	J	17

Table 2.42 continued: Common Black-headed Gull *Larus ridibundus*

Country	Sitename	Year	Count	Type	Ref.
Italy	Laghi Di Mantova	2000	22450	J	17
Italy	Pialasse E Valli Ravennati	2002	21384	J	17
Italy	Delta Del Po - Parte Veneta	2003	21260	J	17
Italy	Laguna Di Venezia	2003	20983	J	17
Italy	Foce Simeto	1998	20000	J	17
Italy	Laguna Di Grado E Marano	2000	15317	J	17
Italy	Manfredonia	1999	12327	J	17
Italy	Laghi Como. Garlate; Olginate	2000	10254	J	17
Italy	Lago D'Iseo	1993	10050	J	17
Italy	F. Brenta. Santa Margherita - Ca' Pasqua	2002	10032	J	17
Italy	Viverone	2002	10000	J	17
Italy	Litorale Romano	2001	7508	J	17
Italy	Trani	2002	6847	J	17
Italy	Milano Sud – Lambro	2000	6715	J	17
Italy	Rada E Porto Di Molfetta	2003	6119	J	17
Kazakhstan	North Caspian Coast total	2003	11340	S	13
Netherlands	Gelderse / Brabantse Maas	1999	20379	J	17
Netherlands	Limburgse Maas	1997	11700	J	17
Netherlands	Ijssel	1998	11635	J	17
Netherlands	Waal	2000	6036	J	17
Oman	Seeb – Qurm	1991	27747	J	17
Oman	Shnass – Sohar	1995	6800	J	17
Oman	Batinah Coast: Sohar-Seeb	1991	6357	J	17
Russia	Wetlands of Upper Volga, Tver region		17800	B	30
Russia	Area between the Kudepsta and Matsesta Rivers		30000	J	17
Spain	Gravera Del Porcal (M)	2000	96000	J	17
Spain	Parque Natural De La Albufera (V)	1993	58287	J	17
Spain	Embalse De El Vicario (Cr)	1990	55000	J	17
Spain	Embalse De Santillana (M)	1998	27000	J	17
Spain	Embalse Vega Del Jabalón (Cr)	1999	20000	J	17
Spain	Embalse De Orellana	1993	16780	J	17
Spain	Aiguamolls De L'emporda (Gi)	1991	16000	J	17
Spain	Gravera De Las Madres (M)	1992	15000	J	17
Spain	Etrsu Toledo	2001	12800	J	17
Spain	Embalse De Castrejón (To)	2001	11600	J	17
Spain	Embalse De Cazalegas (To)	1997	10120	J	17
Spain	Marismas P.N. Bahía De Cádiz	2000	9511	J	17
Spain	Bahía De Gijón	1991	9315	J	17
Spain	Embalse De La Breña	1992	8000	J	17
Spain	Laguna De Sariñena (Hu)	1993	8000	J	17
Spain	Embalse De Rosarito (Av)	1998	7680	J	17
Spain	Gravera Del Campillo (M)	1993	7500	J	17
Spain	Lucios De Beta La Palma-Isla Mayor (Se)	1991	7500	J	17
Spain	Marjal De Almenara (Cs)	2000	7453	J	17
Spain	Arrozal Isla Menor	1991	7000	J	17
Spain	Desagües De Alcázar En Vegas Del Cigüela (Cr)	1997	6956	J	17
Spain	Saco Interior De La Bahía De Cádiz	1996	6791	J	17
Spain	Parque Natural De El Hondo (A)	1997	6448	J	17
Spain	Delta De La Tordera (Gi)	2001	6000	J	17

Table 2.42 continued: Common Black-headed Gull *Larus ridibundus*

Country	Sitename	Year	Count	Type	Ref.
Switzerland	Zürichsee	1990	8651	J	17
Switzerland	Lac De Neuchâtel	1994	6308	J	17
Switzerland	Lac Léman-Ch	2001	6112	J	17
Turkey	Camalti Salt Pans; Gediz Delta	1999	30990	J	17
Turkey	Seyhan Baraji	1992	7500	J	17
Turkey	Uluabat Golu (Apolyont Golu)	1996	6200	J	17
U.A.E.	Khor Khan	1991	49000	J	17
U.A.E.	Khor Dubai	1992	19200	J	17
U.A.E.	Ramtha Tip	1997	17000	J	17
U.A.E.	Mussafah Mudflats	1998	8125	J	17
U.A.E.	Fujeirah-Dibba Coastline	1997	7910	J	17
U.A.E.	Rams	1998	6000	J	17
Uganda	Lutembe Bay	2004	12037	J	17
United Kingdom	Tring Reservoirs	1994	50000	J	17
United Kingdom	Thames Estuary	2001	35410	J	17
United Kingdom	Lower Derwent Ings	1996	31300	J	17
United Kingdom	Hilfield Park Reservoir	1996	25000	J	17
United Kingdom	Forth Estuary	2001	16521	J	17
United Kingdom	The Wash	2000	15716	J	17
United Kingdom	Inner Firth Of Clyde	2001	15356	J	17
United Kingdom	Church Wilne Reservoir	1998	15000	J	17
United Kingdom	Hurleston Reservoir	1995	15000	J	17
United Kingdom	Eccup Reservoir	2002	14000	J	17
United Kingdom	Portsmouth Harbour	2000	13530	J	17
United Kingdom	Chasewater	1999	12000	J	17
United Kingdom	Pitsford Reservoir	1999	12000	J	17
United Kingdom	Poole Harbour	1994	11283	J	17
United Kingdom	Pegwell Bay	2001	10235	J	17
United Kingdom	Doddington Pool	1994	10000	J	17
United Kingdom	Rutland Water	1997	10000	J	17
United Kingdom	Tophill Low Reservoirs	1999	9000	J	17
United Kingdom	Farmwood Pool	1999	8400	J	17
United Kingdom	Lackford Gravel Pits	2003	8000	J	17
United Kingdom	Deben Estuary	1994	7873	J	17
United Kingdom	Derwent Reservoir	1999	7800	J	17
United Kingdom	Ouse Washes	2000	7390	J	17
United Kingdom	Morecambe Bay	1994	7271	J	17
United Kingdom	Irvine To Saltcoats	1995	7000	J	17
United Kingdom	Tamar Complex	1994	6978	J	17
United Kingdom	Alde Complex	2003	6901	J	17
United Kingdom	Ribble Estuary	2001	6793	J	17
United Kingdom	Cheddar Reservoir	1994	6600	J	17
United Kingdom	Belfast Lough	2001	6571	J	17
United Kingdom	Longnewton Reservoir	2002	6500	J	17
United Kingdom	Wintersett & Cold Hiendley Reservoirs	2003	6000	J	17
United Kingdom	Wroxham Broad	2000	6000	J	17
Yugoslavia	Skadarsko Jezero	1993	6750	J	17

2.23.2 Common Black-headed Gull movements

This species breeds in a large area of the Palearctic, from Iceland in the west to Kamchatka Peninsula in the east and north to about 65°N. The Black-headed Gull is largely migratory, but winters within the breeding range of western Europe. The wintering range also covers the Mediterranean, the area of the Black Sea and Caspian Sea and coastal areas of southwestern Asia and northeast Africa. The species also winters in coastal areas of eastern Asia and regularly in Newfoundland and southeast Greenland.

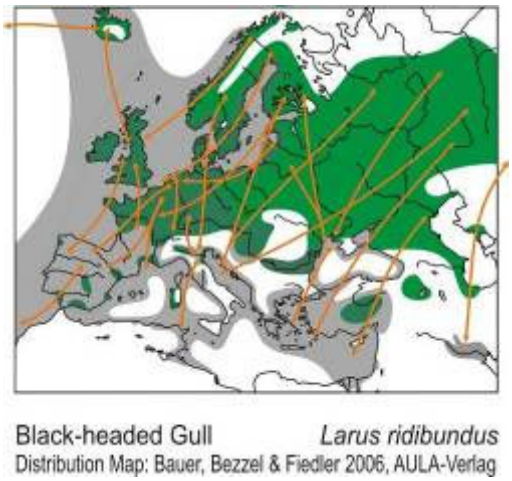


Figure 2.54: Map depicting the movements of Black-headed Gull (*Larus ridibundus*) based on published information and ring recoveries in the EURING Data Bank.

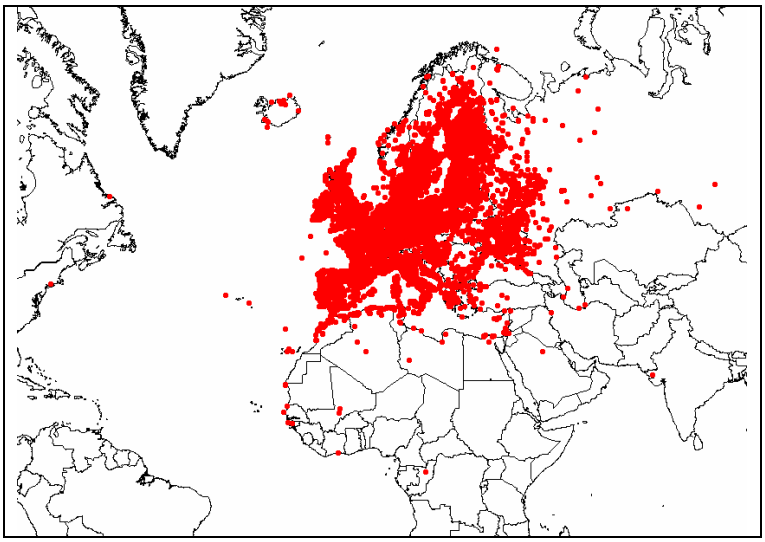
The Black-headed Gull has been widely ringed in Europe and large numbers of recoveries are available from several countries, among them Britain, the Netherlands, Finland, Denmark, Sweden and Belgium. A large part of western and southern Europe is covered by recoveries during the period December to February. The area includes Denmark and southern Sweden and the area of the Black Sea. Winter recoveries are also found along the coast in North Africa and in the Middle East. The return migration starts already in February and in March recoveries are spread northward. In April recoveries are spread out around the Baltic and also further east in Russia. During breeding season (May – June) large numbers of recoveries are found in western, central and northern Europe, most of them west of 45°E. In July – August, an increasing number of recoveries are found in southern Russia and Ukraine and at the same time recoveries are also increasing in southwestern Europe. In November, most Black-headed Gulls have left Finland and Russia, but in the east recoveries are still reported in Ukraine. Birds breeding in Iceland are partial migrants, moving to western Europe or to Greenland and northeastern United States, where two recoveries were found. Birds breeding in northern Europe and northwestern Russia winter in western Europe and south to North Africa. Western European birds and birds breeding in central Europe are mainly sedentary or move south. Some Black-headed Gulls breeding in Germany and Switzerland move south to the Adriatic Sea. Birds from breeding areas in Russia winter in eastern Mediterranean and the Black Sea area, while birds from southwest Siberia move south to the area of the Black and Caspian Seas as well as Kazakhstan, Uzbekistan, Turkmenistan, Pakistan and India.

Table 2.43: Summary of the movements of Black-headed Gull (*Larus ridibundus*) from the literature based on published information and ring recoveries in the EURING Data Bank.

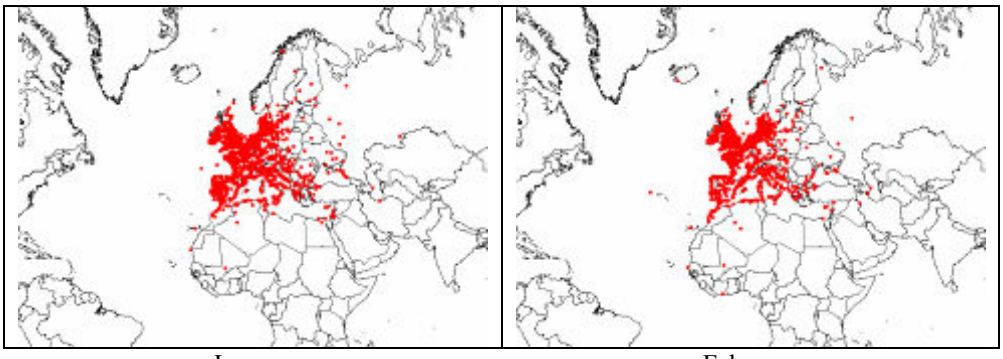
Black-headed Gull *Larus ridibundus*

Distribution: NW- to S-Europe as far as E-Siberia and Kamchatka

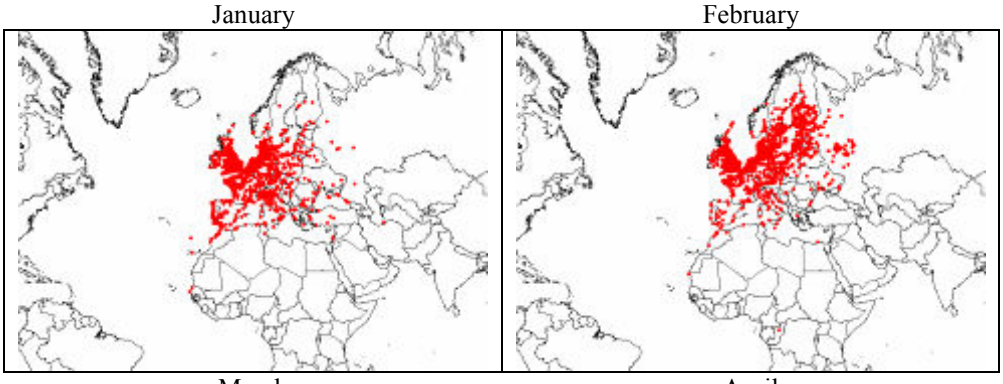
Population (or part of population)	Autumn Migration		Wintering / Non-breeding Grounds		Spring Migration		References
	direction / via	during	location	during	direction / via	during	
Iceland			(partially migratory); Great Britain, Netherlands, Spain, Portugal, SW-Greenland, Newfoundland				1
Ireland, Great Britain			(mainly sedentary); inland, few as far as France, Spain, Portugal, N-Africa				1, 3
Russia	SW		Eastern Mediterranean, Italy, Black Sea, Transcaucasia				3, 12
SW-Siberia	SW		Caspian region, Black Sea, Kazakhastan, Uzbekistan, Turkmenistan, Pakistan, India				11
Fennoscandia	along North Sea shore or Atlantic coast or inland		Denmark, as far as Mediterranean, Italy				1, 2, 5, 12
Norway		Aug	mainly North Sea and Great Britain, Denmark, Netherlands, few to France, Spain	Oct-Dec/Jan		Apr	1, 2, 3, 5
Finland	via Baltic Sea		to North Sea and to France, Spain; overland to Central Europe as far as S-France, former Yugoslavia, Algerien, as far as N-Africa, Black Sea region				1, 2, 3, 6
Denmark	SW		from Denmark, Netherlands, N-Germany, W-SW-Europe to NW-Africa				1, 2, 3, 5
Baltic countries	via Denmark, Netherlands	June-Aug	Western European shores, Mediterranean, Italy, as far as N-Africa				1, 2, 3, 5, 12
Belgium, Netherlands			(partly sedentary); Central Europe to SW-Europe, some NW-Africa				1, 2, 3, 12
Germany, Switzerland	Partially S-SW, along rivers, some cross N-Italy, along Po-Valley	end June-Aug	(mainly sedentary) Adriatic	Oct-Dec/Jan		Feb-Mar	1, 3
other Central European countries	SW, WSW, along rivers		to North Sea region				1
S-France, Spain			(mainly sedentary)				1
Central to E-France			Mediterranean coasts, as far as NW-Africa				1, 3



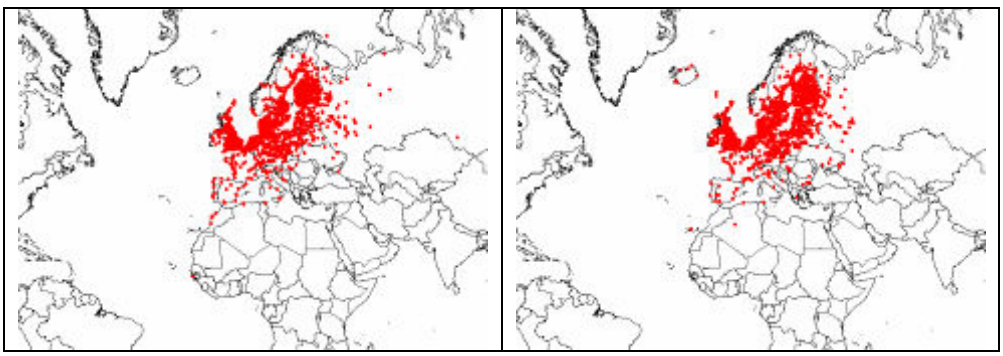
Finding locations of all dead birds



January February



March April



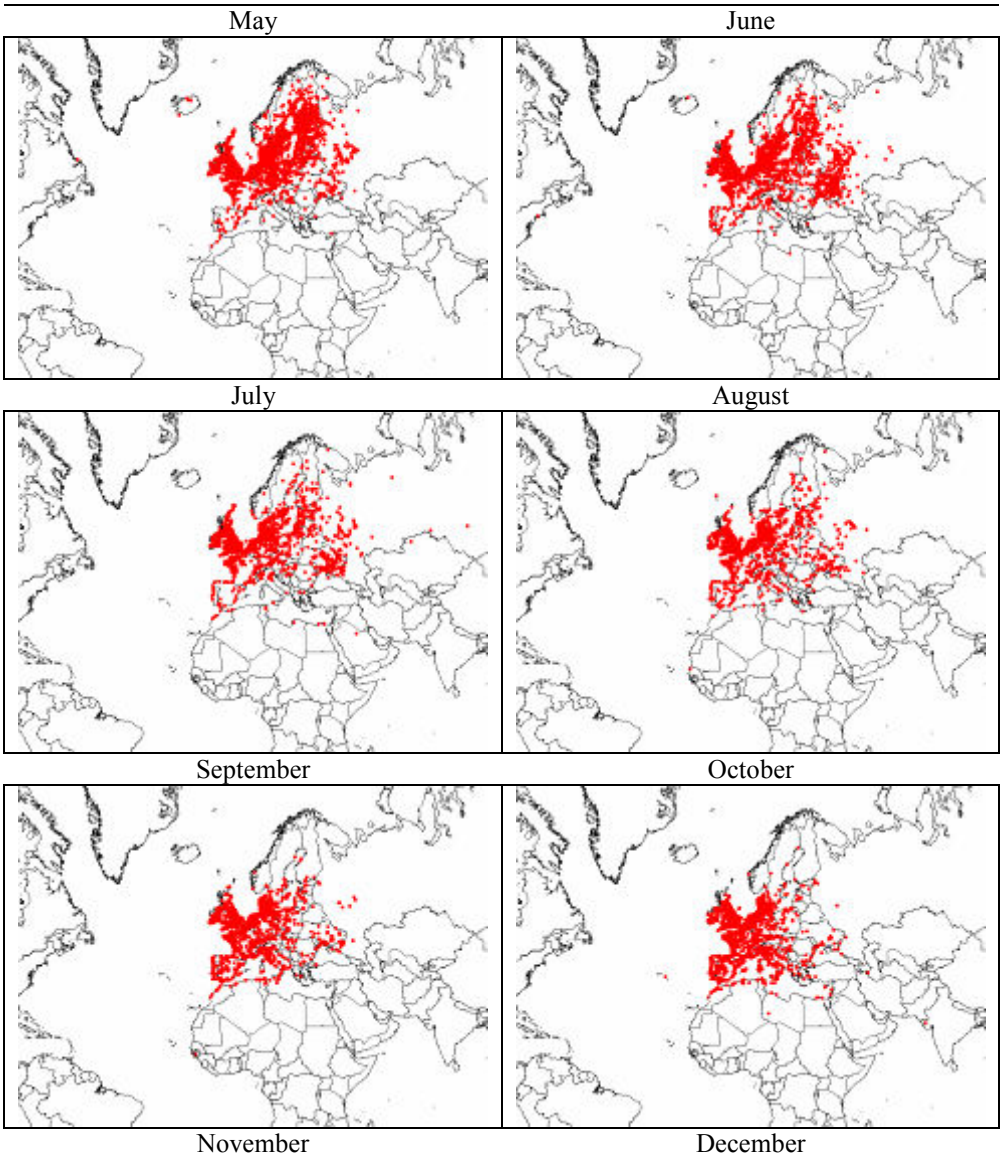


Figure 2.55: Finding locations of all Black-headed Gull (*Larus ridibundus*) in the EURING data bank. All birds are presented and also broken down by month.

2.24 Black Tern (*Chlidonias niger*)

2.24.1 Numbers and Distribution

Russian and European breeding populations migrate almost entirely to sub-Saharan Africa, where distribution is predominantly coastal (Figure 2.56). January counts are concentrated along the west African seaboard from Senegal to South Africa and the highest concentrations have been recorded in Namibia. Important breeding and staging areas have been identified in Russia.

The highest January peak counts have been recorded in Namibia at Walvis Bay, where 61,015 were counted in 2004, and Sandwich Harbour where 24,500 were counted in 1998. In Russia, 15,000 have been recorded staging at the Neman River Delta (Svazas et al. 2003) and 5,000 at Kyzlar Bay (Djamirzoyev et al. 2004). The highest peak count in West Africa was recorded at Lac Nokoue, Benin, where 4,227 were counted in 1998. A total of 3,198 at Hadejia-Nguru, Nigeria, in 1999 is the highest total from an inland site in Africa. Peak counts exceeding 1,000 were made at four sites in Ghana, four in Benin and two in Gabon. The highest of these were at the Densu Delta and at Keta Lagoon (both in Ghana) where totals around 2,400 were counted in 1997 and 2002.

Table 2.44: Black Tern *Chlidonias niger*: Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 10 or more have been recorded.

Country	Sitename	Year	Count	Type	Ref.
Azerbaijan	Sangachal Cape	1997	24	J	17
Benin	Lac Nokoue	1998	4227	J	17
Benin	Bas Delta Du Mono	2001	1650	J	17
Benin	Lac Sele	1996	1170	J	17
Benin	Lagune De Porto Novo	1996	1010	J	17
Benin	Lac Aheme	1998	477	J	17
Benin	Complexe Aho	1996	380	J	17
Benin	So	1998	372	J	17
Benin	Lagune Cotière	1996	250	J	17
Benin	Cotonou	1996	242	J	17
Benin	Fleuve Oueme	2004	70	J	17
Benin	Sea And Beach Near Togbin Daho	1996	50	J	17
Benin	Oueme - So: Nw Depression Valley	1996	30	J	17
Benin	Mono District	1996	15	J	17
Cameroun	Rio Del Rey	1994	200	J	17
Gabon	Gabon Sud	1992	1694	J	17
Gabon	Baie De Corisco	1992	1082	J	17
Gabon	Baie Du Cap Lopez	1992	195	J	17
Gabon	Estuaire Du Gabon	1992	108	J	17
Gabon	Baie De Mondah - Pointe Moka	1998	50	J	17
Gambia	Tanbi Wetland Complex: Bund Road Estuary & Ponds	1993	29	J	17
Gambia	Bao Bolong Wetlands Réserve	2004	20	J	17
Ghana	Densu Delta Ramsar Site	1997	2440	J	17
Ghana	Keta Lagoon Complex Ramasar Site	2002	2422	J	17
Ghana	Songhor Lagoon	1997	1700	J	17
Ghana	Muni Lagoon	1998	1350	J	17

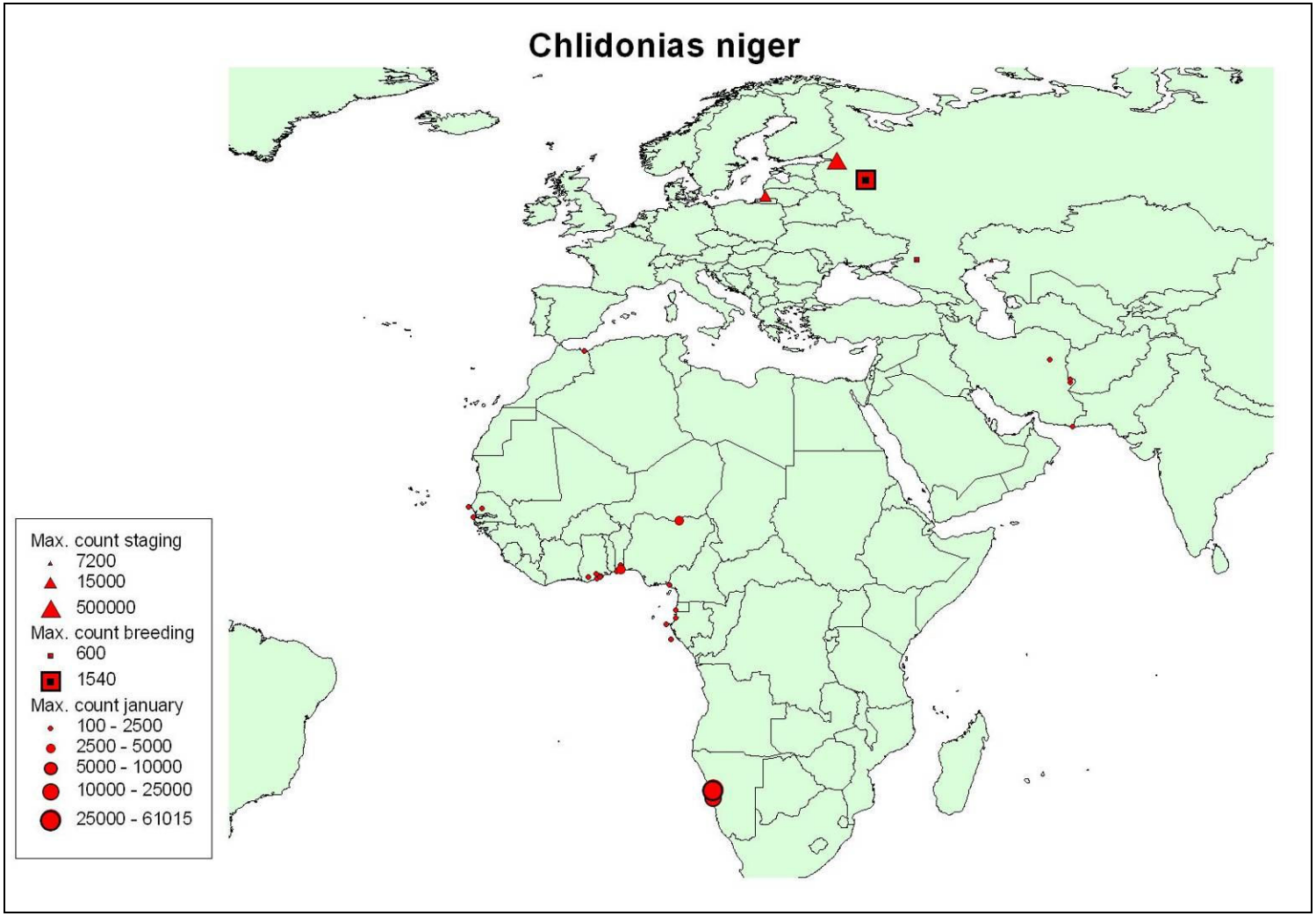


Figure 2.56: Black Tern *Chlidonias niger*. Peak counts between 1990 and 2005 at sites in Europe, Africa, West and Central Asia where 100 or more have been recorded.

Table 2.44 continued: Black Tern *Chlidonias niger*

Country	Sitename	Year	Count	Type	Ref.
Ghana	Sakumo Lagoon	2001	586	J	17
Ghana	Korle Lagoon	1999	209	J	17
Ghana	Esiama Beach	2002	50	J	17
Guinee	Rio Kompony Ouest	2000	31	J	17
Guinee	Iles Tristao Ouest	2000	30	J	17
Guinee	Rio Kompony Est	2000	30	J	17
Guinee	Khonibombe	2003	13	J	17
Iran	Hamoun Lakes Complex: Hamoun-E-Saberi	1993	707	J	17
Iran	Hamoun Lakes Complex: Kuh-I-Khajeh	1993	607	J	17
Iran	Govater Bay & Hur-E-Bahu: Bahookalat River	1993	240	J	17
Iran	Shaheed Parsa Dam: 2	2003	121	J	17
Iran	Oman Sea Coast (Western Part): Pozm Khoor & Bay	2003	29	J	17
Iran	Hoor Al-Azim Marshes	1997	25	J	17
Iran	Caspian Coast (Gilan): Hashtpar – Anzali	1997	21	J	17
Mauritanie	Mahmouda	2004	11	J	17
Morocco	Embouchure De L'Oued Moulouya: Nador	1992	200	J	17
Morocco	Sebkha Bou Areg = Mar Chica: Nador	1994	25	J	17
Morocco	Dayet Al Hafs (Jorf Lasfar)	1992	20	J	17
Namibia	Walvis Bay Ramsar Site	2004	61015	J	17
Namibia	Sandwich Harbour: Southern Wetlands	1998	24500	J	17
Namibia	Sandwich Bay, Namib-Naukkuft Park	2004	15000	J	17
Namibia	Mile 4 (Swakopmund) Saltworks	1997	1200	J	17
Namibia	Swakop River Mouth	1992	52	J	17
Niger	Karandi	1994	15	J	17
Nigeria	Hadejia-Nguru, All Quadrats	1999	3198	J	17
Russia	Wetlands of Upper Volga, Tver region		1540	B	30
Russia	Kuban Delta		1340	B	11
Russia	Neman River delta		1000	B	35
Russia	Lake Lacha		300	B	24
Russia	Neman River delta		15000	S	35
Russia	Kyzlyar Bay		5000	S	7
Senegal	Ile De Ngor	1999	400	J	17
Senegal	Ile Et Plage De Yoff (Ile Jusqu'A La Cite Djily Mbaye)	1999	260	J	17
Senegal	Parc National Des Oiseaux De Djoudj	1996	72	J	17
Senegal	Niaye De Pikine (Technopole)	1999	55	J	17
Senegal	Lagunes De St.Louis (Total)	2002	20	J	17
South Africa	Vaal Dam (East)	2004	45	J	17
South Africa	De Hoop Vlei	2002	24	J	17
Spain	Del Palacio A La Algaida (H)	2001	23	J	17
Tchad	Bahi (Bongor) Lifi	2001	25	J	17
The Gambia	Tanji Bird Reserve (Bijol Island)	2001	144	J	17
The Gambia	Baobolong Wetland Reserve (Illiassa To Conteh Dunoa)	2001	13	J	17
Togo	Lente	2001	48	J	17
Togo	Nangbeto Aval	2004	48	J	17
Togo	Koumongou	2004	31	J	17
Togo	Nangbeto Amont	2004	31	J	17
Togo	Ognabe	2004	16	J	17
Togo	Tambigou	2001	16	J	17
Togo	Domaine Gravioux	2004	12	J	17
Togo	Pont Koumongoukan	2001	12	J	17

2.24.2 Black Tern movements

The Black Tern breeds locally in continental Europe and eastward to eastern Mongolia, between about 45°N and 55°N and also in North America. The species is migratory and birds breeding in the Palearctic winter mainly along the coast in West Africa, but also along the Nile in Egypt and Sudan.

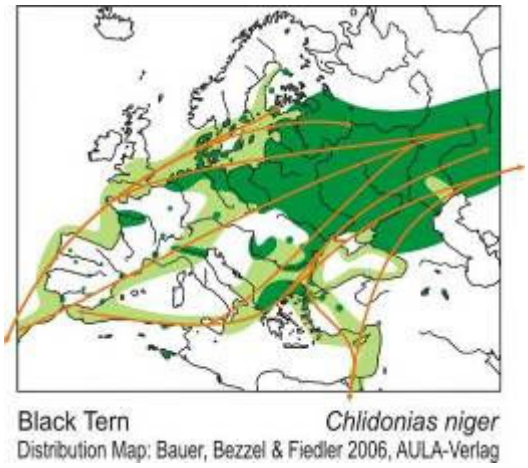


Figure 2.57: Map depicting the movements of Black Tern (*Chlidonias niger*) based on published information and ring recoveries in the EURING Data Bank.

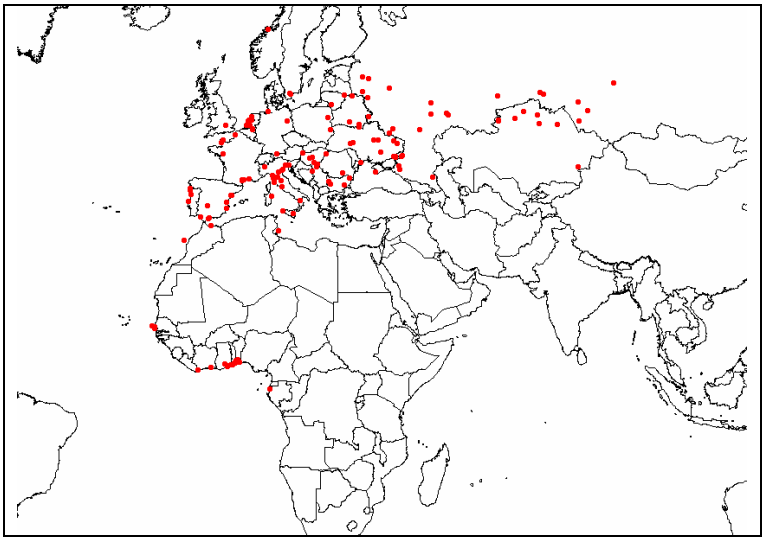
This species is ringed only in small numbers in Europe and it is only ringing carried out in Italy and the Netherlands that has resulted in more than a few recoveries. Recoveries from the winter (November – February) are reported mainly from West Africa in Benin, Togo, Ghana, Ivory Coast, Gabon and Senegal. In April, birds are found in Italy and the Netherlands and in May further east in Europe and in Siberia. During the breeding season (June – August) birds are spread out in central and eastern Europe, southern Russia, southwestern Siberia and in northern Kazakhstan. In June, recoveries start to appear in the Netherlands and in August also in southwestern Europe and northwestern Africa. In October only a few recoveries of Black Terns are reported in Europe. The migration mainly follows the West African coast, both in autumn and spring, and only small numbers are believed to pass inland over the Sahara desert. Birds from a large breeding area pass through the Netherlands during summer and autumn and include birds from breeding areas as far east as southwest Siberia. During spring, larger numbers seem to pass through Italy on their way to breeding sites in central Europe and eastward to Siberia, indicating a loop migration.

Table 2.45: Summary of the movements of Black Tern (*Chlidonias niger*) from the literature based on published information and ring recoveries in the EURING Data Bank.

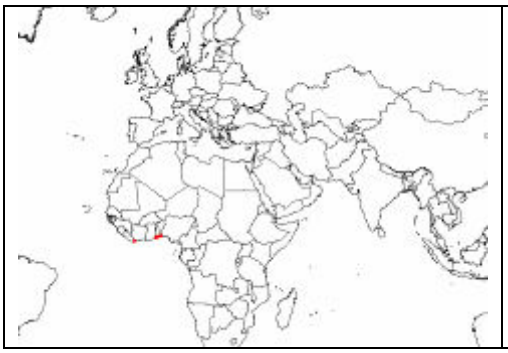
Black Tern *Chlidonias niger*

Distribution: from SW-Europe to E-Mongolia

Population (or part of population)	Autumn Migration		Wintering / Non-breeding Grounds		Spring Migration		References
	direction / via	during	location	during	direction / via	during	
	along Atlantic coast, via Mediterranean	Aug-Sep		Mar-mid May	along coasts, W-Mediterranean, SW-Europe, loop migration	Mid April, Mid May (Central Europe)	1
S-Sweden			as far as tropical West-Africa				1, 4
Netherlands	S-France, S-Italy		W-Africa				2
Denmark (rare)			W-Africa				5
Finland			W-Africa, (Ivory coast)				1
SW-Siberia	via Caspian region, Italy; passage via Egypt by birds heading to South Africa (?; although only vagrants recorded in East Africa)		Italy, Mediterranean, probably also Southern Africa, Namibia				1, 11

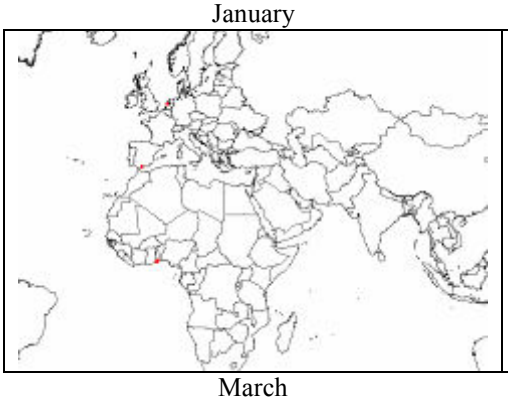


Finding locations of all dead birds

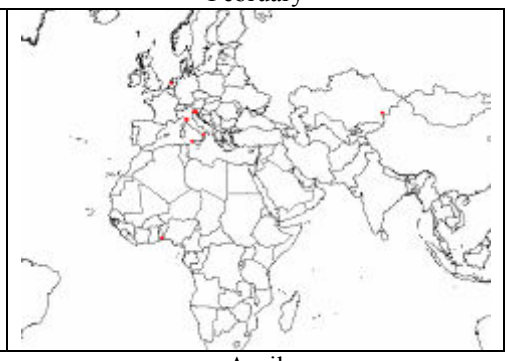


January

February



March



April

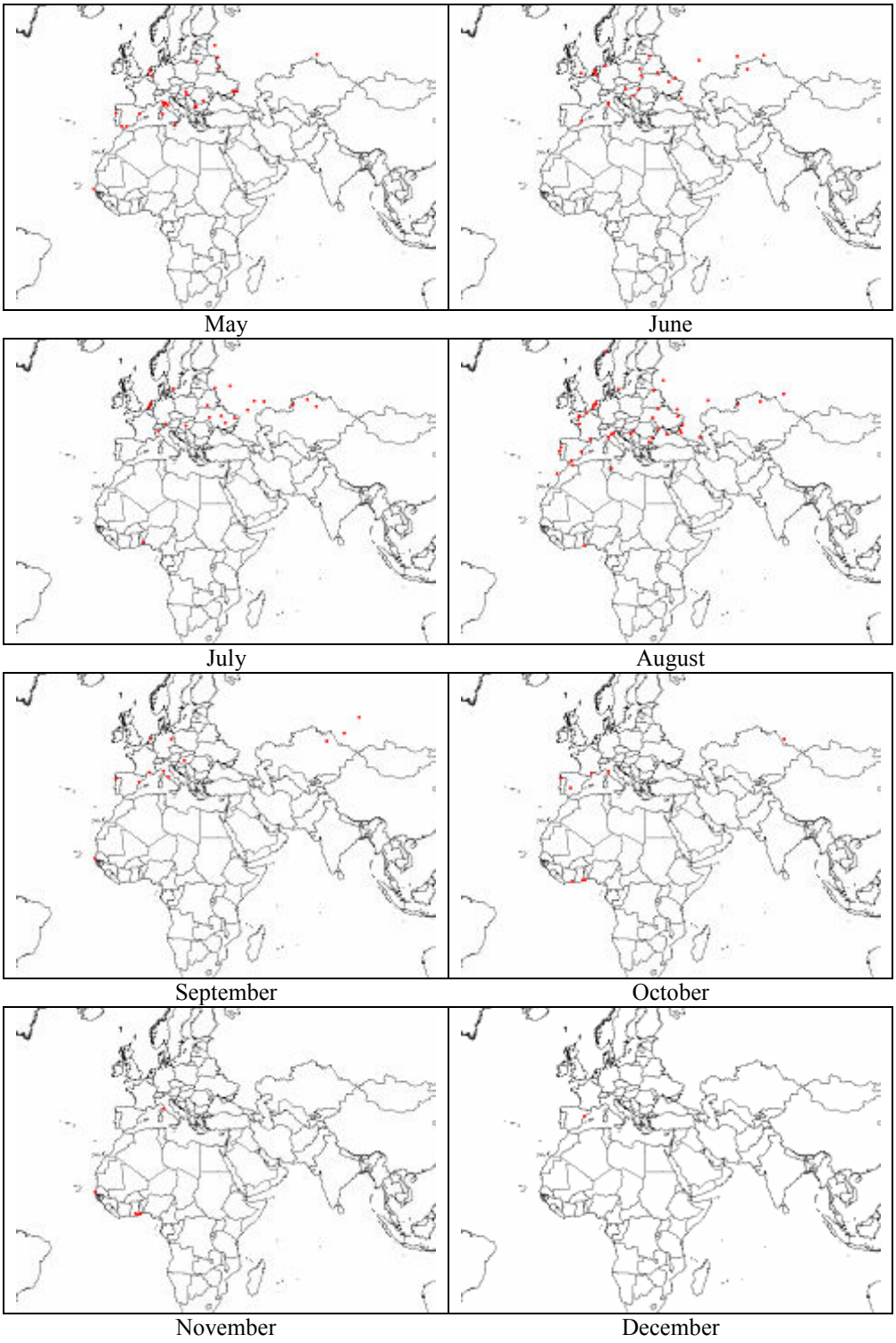


Figure 2.58: Finding locations of all Black Tern (*Chlidonias niger*) in the EURING data bank. All birds are presented and also broken down by month.

2.25 Discussion: Outbreaks of HPAI in Europe and beyond in 2005-2006

The data provided in this report can be used in a number of ways. For example, they can be used for locating high risk concentration and mixing areas of Higher Risk species, and for interpreting, explaining and even possibly predicting outbreaks of HPAI. In this Discussion we outline the outbreaks of H5N1 HPAI in Europe in early 2006, and use the Mute Swan *Cygnus olor* as an example. This was a key species in outbreaks of HPAI H5N1 in Europe in 2005-2006 and a discussion of outbreaks affecting this species sheds light on the role of wild waterbirds in the spread of the disease in the winter of 2005-2006 and the following spring.

Numbers and distribution

There are two metapopulations of Mute Swan *Cygnus olor* in western Eurasia, divided for the purposes of conservation management into five populations, as follows:

Population	Population estimate	Population trend
Mainland NW & Central Europe	250,000	Increasing
Britain	37,500	Increasing
Ireland	10,000	Unknown
Total, NW & Central Eurrope	**297,500**	**Increasing**
Black Sea	45,000	Increasing
W & Central Asia, Caspian	250,000	Increasing
Total, Central Asia & SE Europe	**295,000**	**Increasing**

Nearly all populations have been increasing for many years, although there are indications of a decrease in numbers of birds wintering around the Baltic since around 1990, which may be related to reductions in numbers breeding in Sweden and Lithuania. Recent information on the status of the Central Asia and SE Europe population is lacking, and the estimates for these populations have not been changed since 1996. Increasing numbers are wintering in the south of the range, for example, the number of Mute Swans wintering in Italy in normal winters increased from fewer than 500 in the early 1990s to nearly 2,500 in the early 2000s.

Most important countries and sites

The European country with the highest breeding population of Mute Swans is Russia with 15,000-20,000 pairs. The following countries (in rough order of importance) have an estimated 1,000-10,000 pairs: Germany, UK, Ireland, Finland, Netherlands, Poland, Sweden, Denmark, Estonia, France and Lithuania. Romania has an estimated 750-1,000 pairs and all other countries are estimated to hold fewer than 1,000 pairs.

Mute Swans form some sizeable congregations during the winter months (See 2.8 above). The largest recorded by the International Waterbird Census (IWC) are on the northern Black Sea coast of Ukraine, where 14,510 individuals were counted in the eastern Sivash in January 2000, and on the Baltic coast of Denmark where 14,565 were counted at Lolland Northwest in January 1994. Counts in the Baltic have decreased in recent years and 7,626 were counted at Lolland Northwest in January 2003. Between 1990 and 2004, 12 counts higher than 10,000 were submitted to the IWC database, of which seven came from sites in Denmark and five from sites in Ukraine. A count of 8,900 at the Meric Delta in Turkey in the cold weather of

January 1999 indicates how some birds from the Black Sea region migrate south in response to abnormally cold winters.

Movements
The north-west and central European population is largely sedentary, except in the east, where birds breeding in the Baltic region may move to the Baltic coast for the winter, and may be pushed further west by unusually cold winters. Some Polish birds move south and west into Central Europe for the winter.

The population found in Central Asia, southern and south-eastern Europe is more migratory, but again, movements are strongly influenced by the severity of winter weather. In most years, the bulk of the population breeding in the Black Sea region migrates short distances from inland breeding sites to the northern Black and Azov Sea coasts, although a small number of birds usually migrate further south to the Danube Delta, Turkey, the Balkan Peninsula and southern Italy. Birds breeding in the Caspian Sea region show a similar pattern of movement and most of the population stays close to the Caspian shore throughout the year. In hard winters, large movements of swans south to Azerbaijan and Dagestan have been recorded.

The outbreak of HPAI H5N1 in Mute Swans in southern Europe February 2006
The outbreak of HPAI H5N1 in Mute Swans appeared more-or-less simultaneously in early February in Italy, in the southern regions of Puglia, Calabria and Sicily, in northern Greece near Thessaloniki, and in Bulgaria in the northwestern Province of Vilin and probably also Varna, on the Black Sea. The outbreak involved small numbers of birds, but was confirmed as involving H5N1on 11 February. On 12 February, Slovenia also reported a suspected case of H5N1 in a swan on the border with Austria.

Previous outbreaks in South & East Europe
Outbreaks of H5N1 were reported between October and December 2005 from Russia, Romania, Croatia, Ukraine and Turkey. A majority of outbreaks in all these countries involved domestic poultry, but wild waterbirds, especially swans were also involved. At least 250 Mute Swans died of HPAI H5N1 in the Volga Delta on the north coast of the Caspian Sea in November 2005 and considerable numbers (probably hundreds, widely reported as being Whooper Swans) also died in the Danube Delta region of Romania. Small numbers of Mute Swans also died at fish ponds in Romania and Croatia in November 2005, where the use of infected poultry manure for fertilisation was suggested as being a possible cause.

Possible causes of the February 2006 outbreak in swans in southern Europe
January 2006 was exceptionally cold throughout Eastern Europe and there is little doubt that this caused cold-weather movements of Mute Swans to the southern and western extremities of their normal wintering range. These outbreaks added to the evidence that infected birds may be capable of migration. This population of swans had already been infected with H5N1 earlier in the winter and it seems probable that they then transported the disease to the secondary outbreak sites. Another possible explanation is that the disease was spread by a different species, and that the swans, being highly susceptible to HPAI and conspicuous when they die, and in these cases weakened by unusually long migratory flights, acted as sentinels of the disease.

Development of further outbreaks

Later in February 2006, a Pochard near Lyons in France, and several dozen Mute Swans in the East Baltic in Northern Germany, died of H5N1 whose origin was impossible to explain. The spread to small numbers of Tufted Ducks in Sweden in March seems likely to have originated from these infected wild birds in the nearby southeast Baltic, an area where large numbers of these two species mix extensively.

Outbreaks in Africa

In Africa, the first outbreaks of H5N1 occurred in northern Nigeria in January 2006. The spread to West Africa was attributed by some to wild waterbirds, with Garganey *Anas querquedula* and Northern Pintail *Anas acuta* being suggested as likely vectors because they migrate from areas of Western Siberia and west Russia affected by earlier H5N1 outbreaks to West Africa, including wetlands in northern Nigeria. An alternative explanation was that the outbreaks in Nigeria originated from trade in poultry and poultry products. The origin of these outbreaks was not successfully explained. By the end of April, cases had been reported in Burkina Faso, Cameroon, Egypt, Niger, Nigeria and Sudan. These cases all involved domestic poultry, except in Burkina Faso where only wild birds were affected, and Egypt and Nigeria where both wild and domestic birds were involved.

The situation in Europe in May 2006

Figure 2.59 is a summary of the outbreaks of HPAI in wild birds in Europe between January and early May 2006.

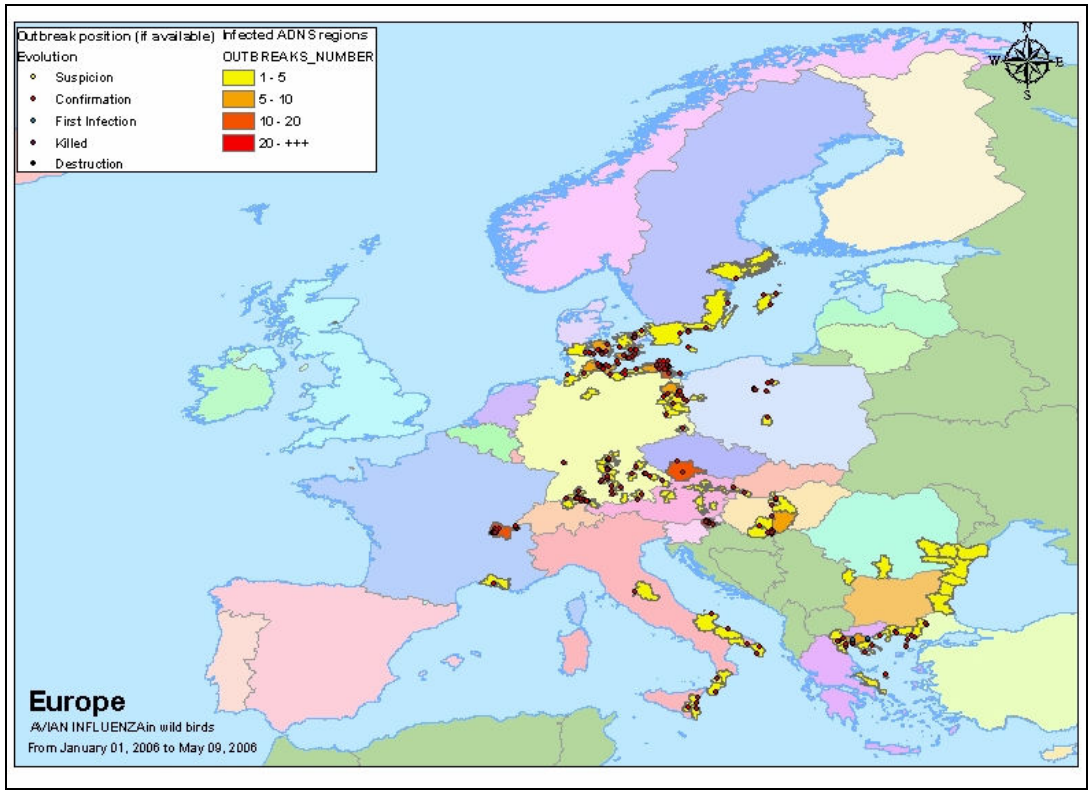


Figure 2.59: Source: http://ec.europa.eu/comm/food/animal/diseases/adns/index_en.htm#

By early May 2006, H5N1 HPAI had caused the deaths of wild birds in 13 Member States of the EU. These countries were Austria, Czech Republic, Denmark, France,

Germany, Greece, Hungary, Italy, Poland, Slovakia, Slovenia, Sweden and The UK. In France, Germany and Sweden, domestic birds were also involved. All outbreaks were relatively small in scale, and all quickly died out or were quickly brought under control.

The pattern of outbreaks involved most of the regions identified as holding particularly important concentrations of sites with high numbers of wintering waterbirds: The Black Sea-East Mediterranean region, The Southwestern Baltic, and lakes north of the Alps. Beyond Europe, one of the biggest outbreaks among wild birds was recorded in Azerbaijan, a country where extremely high numbers of wintering waterbirds are counted. Subjective assessment suggests that H5N1 HPAI outbreaks in wild birds were more prevelant in early 2006 in regions with a high density of sites holding large numbers of waterbirds in winter. An exception to this observation was the southern North Sea region, particularly The Netherlands and The UK, which hold high numbers of wintering waterbirds, but where only one case of H5N1 HPAI was recorded, in a Whooper Swan washed ashore in eastern Scotland.

The migration of millions of waterbirds from Africa and Europe, through Europe in a northerly and easterly direction to Russia in March and April 2006 was predicted by some to be a likely cause of an accelerated spread of outbreaks involving more European countries. At the time of writing (early May 2006) the migration is almost over, but the disease remains apparently rather dispersed in isolated parts of Europe.

Future risks

- Swans are large, conspicuous birds living in open habitats, and dead birds stand a relatively high chance of being found. If other species were affected by this outbreak, the chances of finding corpses would be lower. The chances of an outbreak being undetected might be quite high for some species, especially inconspicuous ones which use densely vegetated habitats, such as Common Teal *Anas crecca*.

- Some Mute Swans associate closely with man, and the risk of infection of poultry by this species and vice versa is probably higher than for most waterbird species. The population of Mute Swans in eastern and southern Europe is usually wilder than its northern and western European counterpart, however, and this risk probably increased once the disease spread north into this population.

- Mute swans are not highly migratory, but the populations affected by the exceptionally cold 2005-2006 winter in eastern Europe will have migrated back to the areas where some may have picked up the disease, and to their breeding range further east and north in Europe, mainly in Ukraine and Russia. Most infected birds would be expected to die, and the extent to which returning migrants will take the disease with them depends on the proportion of the population that can carry the disease without showing symptoms. This is currently unknown.

- Another possibility is that waterbirds of at least 30 species, which will have migrated north and east through infected parts of southern Europe in March and April 2006 might have mixed with infected Mute Swans and become infected themselves. It seems possible that these infected waterbirds of other species could then have migrated to many parts of Europe, taking the disease with them. If this

had happened to a great extent during the spring migration in 2006, it is likely that evidence in the form of dead birds would have been found. Unfortunately, the extent to which this mixing of species might cause onward transmission, and the species and sites that pose the greatest risk are not yet understood.

- Even though the scale of the outbreaks during the spring migration of 2006 was smaller than some experts predicted, it seems possible that the disease may persist in some wild waterbird populations, and that these populations will continue to be affected in future. The wetlands in the north European and Siberian breeding grounds of many of these species apparently provide conditions favourable to the survival and spread of HPAI viruses, and immature birds are thought to be more susceptible to the disease than adults. It therefore seems possible that outbreaks of HPAI in wild waterbirds will continue in the years to come.

3. Rapid assessment of ornithological data at site level

3.1. Introduction

Outbreaks of H5N1 among wild birds usually occur at the level of wetland sites. They often occur unexpectedly, confronting site managers with an emergency situation, which demands quick action. Managers, together with local and national authorities will have to take decisions with respect to restricting human use of the site, monitoring bird mortality and sampling for virus prevalence. Any outbreak of H5N1 in a wetland site will also lead to a series of questions, which necessitate quick answers.

Such questions include:

- How many birds are infected and which species are involved?
- Are there Higher Risk species present and in what numbers?
- Is there a special risk for transmission of the virus to poultry in the neighbourhood and if so, which species can be expected to be involved?
- Are there endangered species present which might need special attention and/or protection?
- Are there any neighbouring sites to which the virus might spread because they are commonly used by the same birds?
- What is the position of the site in the flyways of migratory waterbirds and can any prediction be made with respect to spread of the disease at a larger geographical scale?
- What is the timing of migration for higher risk species occurring at the site?

Answering these questions makes it necessary to quickly analyse ornithological data which might be managed by different organizations and/or individual ornithologists.

This chapter deals with the development of a *Rapid Assessment Format for Ornithological Data in case of an Outbreak of H5N1*. Its aim is to give some guidance to site owners and site managers to help them prepare for an outbreak of H5N1 in their wetland area. Since wetland sites vary greatly with respect to size, habitat characteristics, ornithofauna, human use and other aspects, the format provided is of a very general nature. Its main purpose is to guide and stimulate site managers to seriously consider possible future events, to prepare for an outbreak of HPAI, and to develop a strategy in anticipation of the possible spread of the disease to their site.

3.2 Procedure followed

We first developed a draft Assessment Format by listing the following site-related information and attributes which are considered to be fundamental in preparing for an H5N1 outbreak:

1. General information on the site (location, size, ownership)

2. Short description of the general and ecological characteristics of the site (accessibility, habitat characteristics, human use)
3. The occurrence of vulnerable bird species (status, numbers and seasonal presence of higher risk species, species with a high "contact risk with poultry" and endangered species)
4. Places with high concentrations of vulnerable bird species within the site
5. Local movements of vulnerable bird species to neighbouring sites
6. Position of site in flyway and consequences of bird movements for further spread of H5N1
7. Human use of the site and its disturbance effects
8. The existence of poultry farms within a radius of 10 km of the site
9. Measures to be considered in case of an outbreak
10. Data sources

After the assessment format had been developed and guidelines for its use added, it was tested for the following sites (Figure 3.1):

- National Park Schiermonnikoog (Island in the Wadden Sea in the north of the Netherlands)
- The Camargue (Delta of the river Rhône in the south of France)
- Djoudj National Park (part of the delta of the Senegal river in the north of Senegal)
- Eastern Sivash (system of lagoons and lakes bordering the Sea of Azov, Crimea, Ukraine)

Figure 3.1: sites where the Assessment Format was tested, and for which results are presented in this chapter.

The sites were selected on the basis of their different geographical locations on the flyways of waterbirds migrating through Europe, as well as their different sizes, abiotic and biotic characteristics. Further differences were that National Park Schiermonnikoog and the Djoudj National Park were not under direct threat of an outbreak of H5N1. In the Camargue, however, H5N1 had been recorded at a distance of 50 km from the park in February 2006, and a series of outbreaks had taken place in the Eastern Sivash in the period October 2005-February 2006.

The site assessments were compiled by Wetlands International staff from the offices in Wageningen, Kiev and Dakar, in collaboration with the managers of the sites, and by staff of the Biological Station at Tour Du Valat in The Camargue. Finally, the draft format (presented as Annex 3.1) was adapted on the basis of the experience gained with the different sites tested.

Ornithological data are often spread over different organizations and a variety of "owners" may need to be approached in order to obtain all relevant data for a particular site. In general, site managers will know best where relevant data can be found. A number of international organizations manage large ornithological databases, sometimes dealing with information about bird populations at a global scale. Besides, in many EU member states some larger organizations either manage national databases or might give guidance as to where relevant information might be found.

3.3 Site assessments

3.3.1 National Park Schiermonnikoog, the Netherlands

1. General information

Name of site: National Park Schiermonnikoog
Country: The Netherlands
Coordinates: "53° 28' N – 06° 11' E
Size: 6800 ha
Managing organization: Vereniging Natuurmonumenten, Noordereinde 60,
1243 JJ 's-Graveland, The Netherlands,
Tel: +31 (0)35-6559933

2. Short description of the site

Topography
The National Park Schiermonnikoog consists of the island of Schiermonnikoog and parts of the North Sea and Wadden Sea adjacent to the island (see Figure 3.2). The island measures 15 x 3 km. There is one village at the western end of the island with approximately 1000 inhabitants. There are several houses in the dunes NW of the village and in the Banckspolder, mainly used for recreational purposes. The island can be reached from the mainland by ferry (3-5 times/day).

Schiermonnikoog is one in a chain of islands forming a barrier between the North Sea and the shallow Wadden Sea. The Dutch Wadden Sea (total length 120 km) is characterized by extensive tidal flats, intersected by numerous creeks and channels. In the east the area is connected with the ecologically similar German and Danish Wadden Sea together forming the International Wadden Sea.

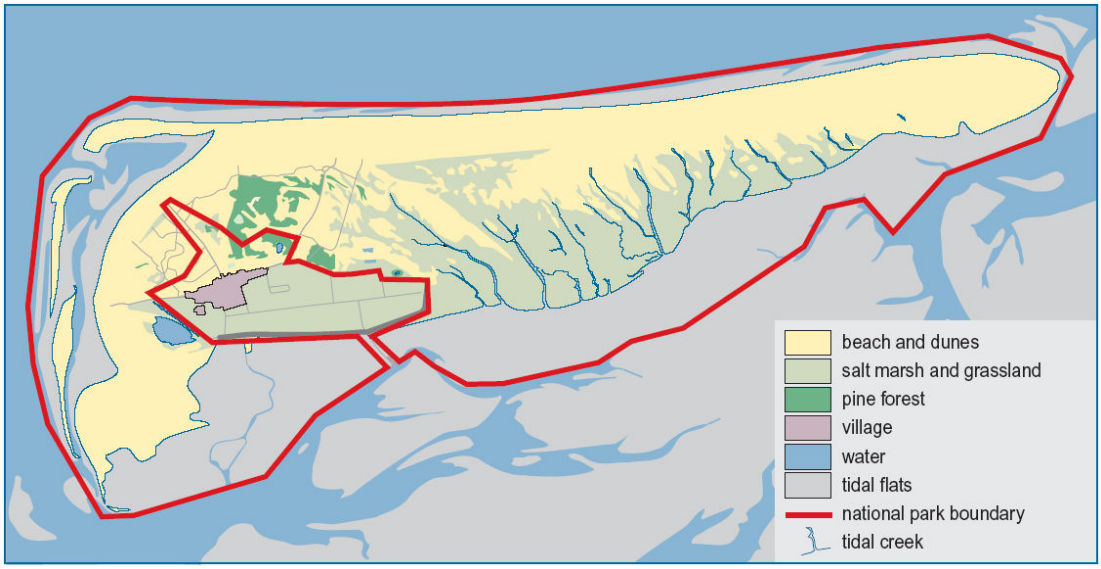


Figure 3.2: Topography of the Island of Schiermonnikoog with national park boundaries and main habitat types indicated

Habitat types
The main habitat types of the site are (see Figure 3.2):
- sandy beaches (along North Sea coast and at western and eastern tips of island)
- dunes (forming the central part of the island and situated in ridges parallel to the North Sea coast (younger dunes) as well as directed from NW to SE (older dunes))
- salt marsh with creeks (Oosterkwelder and Strandvlakte)
- grassland polder protected by dike in the south (Banckspolder, not included in National Park)
- freshwater lakes (Westerplas, Kooiplasjes)
- duck decoy (Eendenkooi, at eastern edge of polder)
- pine forest (1e dennen and 2e dennen, north of village),
- tidal flats with creeks and channels (Wadden Sea, south of island).

Water depth, water temperature and hydrology
Water depth of the North Sea gradually increases in a northward direction with the 20 m depth line at 3 - 4 km from shore. The incoming tide enters the Wadden Sea through channels east and west of the island. The Wadden Sea is intersected by numerous creeks and channels of varying depth (maximum 10 m). About 70-80% of the area consists of tidal flats which are submerged during high tide. Relatively high water temperatures can be reached in shallow pools with stagnant water.

3. Occurrence of vulnerable bird species in site

Numbers and seasonal presence of higher risk species

Table 3.1: Numbers and seasonal presence of higher risk species occurring in relatively large numbers in Nationaal Park Schiermonnikoog. Mean numbers are based on counts carried out on the high tide roosts in the period 1961-2004; maximum numbers are given for the period 1966-2004. For more details see Table 3.2.

Species		Breeding pairs 2001	Migration and/or wintering period		
			period	mean number	maximum number
Greylag Goose	*Anser anser*	32	Oct-Febr	70-200	1300
Barnacle Goose	*Branta leucopsis*	0	Oct-Apr	800-5000	13012
Brent Goose	*Branta bernicla*	0	Sept-May	500-2500	6411
Eurasian Wigeon	*Anas penelope*	1	Sept-Febr	1000-9000	27100
Common Teal	*Anas crecca*	6	Sept-Febr	200-3200	19190
Mallard	*Anas platyrhynchos*	250	June-Febr	200-700	2790
Northern Pintail	*Anas acuta*	1	Sept-Febr	300-1200	4080
Northern Shoveler	*Anas clypeata*	34	July-Febr	20-70	400
Common Pochard	*Aythya ferina*	9	Oct & Jan	20-30	45
Northern Lapwing	*Vanellus vanellus*	174	July-March	10-130	640
Eurasian Golden Plover	*Pluvialis apricaria*	0	Aug-April	50-450	2000
Black-tailed Godwit	*Limosa limosa*	42	July-August, March-April	20-40	300
Black-headed Gull	*Larus ridibundus*	6921	June-Oct	500-8000	18139
Common Gull	*Larus canus*	839	July-Febr	300-5000	18745

Table 3.2: Occurrence of higher risk species in Nationaal Park Schiermonnikoog

English name	Latin name	Status	Breeding	Migration and/or wintering period				
		Breeding B Migrating M Wintering W	Breeding pairs 2001	Period	Occurrence	Mean numbers 1961-2004	Maximum numbers 1966-2004	Maximum numbers autumn-winter-spring 1961-2003
		M						
Bewick's Swan	*Cygnus columbianus*	M	0	Oct-May	occasional		40	
Mute Swan	*Cygnus olor*	B,M,W	1	unclear	regular		24	
Pink-footed Goose	*Anser brachyrhnchus*	M,W	0	Oct-April	irregular, passing		600	
Bean Goose	*Anser fabalis*	M	0	Oct-April	irregular, passing		200	
Greater White-fronted Goose	*Anser albifrons albifrons*	M,W	2	Dec-Febr	irregular, passing		700	
Lesser White-fronted Goose	*Anser erythropus*	M,W	0	Nov-Febr	rare		1	
Greylag Goose	*Anser anser*	B, M, W	32	Oct-Febr	regular	70-200	1300	
Barnacle Goose	*Branta leucopsis*	M,W	0	Oct-April	regular	800-5000	13000	7370-9554-13012
Brent Goose	*Branta bernicla*	M,W	0	Sept-May	regular	1000-2500	6000	3583-2925-6411
Red-breasted Goose	*Branta ruficollis*	M,W	0	Sept-May	regular		4	
Eurasian Wigeon	*Anas penelope*	M,W	1	Sept-Febr	regular	2000-9000	22000	27100-8390-1969
Common Teal	*Anas crecca*	B,M,W	6	Sept-Febr	regular	500-3200	19000	2055-2412-377
Mallard	*Anas platyrhynchos*	B,M,W	250	June-Febr	regular	300-600	2800	
Northern Pintail	*Anas acuta*	B,M,W	1	Sept-Febr	regular	400-1000	4000	4080-3567-67
Garganey	*Anas querquedula*	B	1	unclear	scarce			
Northern Shoveler	*Anas clypeata*	B,M,W	34	July-Febr	regular	20-50	400	241-420-44
Marbled Teal	*Marmaronetta angustirostris*				no records			
Red-crested Pochard	*Netta rufina*	M	0	May-June	rare		1	
Common Pochard	*Aythya ferina*	B,M, W	9	Oct & Jan	regular	20-30	45	
Tufted Duck	*Aythya fuligula*	B,M,W	11	unclear	regular	10	few tens	
Northern Lapwing	*Vanellus vanellus*	B,M,W	174	July-March	regular	50-120	640	640-150-428
Eurasian Golden Plover	*Pluvialis apricaria*	M,W	0	Aug-April	regular	200-400	2000	1185-1600-2000
Black-tailed Godwit	*Limosa limosa*	B,M	42	July-August, March-April	regular	20-40	300	
Ruff	*Philomachus pugnax*	M	0	March-April, July-Aug	regular	up to few tens	45	
Black-headed Gull	*Larus ridibundus*	B,M,W	6921	June-Oct	regular	1000-7000	18139	18139-528-13081
Common Gull	*Larus canus*	B,M,W	839	July-Febr	regular	1000-4000	18745	14600-10974-1862

Presence of other waterbird species which occur in large numbers:

Table 3.3: Numbers and seasonal presence of other waterbird species occurring in relatively large numbers in National Park Schiermonnikoog. Mean numbers are based on counts carried out on the high tide roosts in the period 1961-2004; maximum numbers are given for the period 1966-2004.

Species		Breeding pairs 2001	Migration and/or wintering period		
			period	mean number	maximum number
Common Eider	*Somateria mollissima*	2943	year round	300-4000	10130
Common Shelduck	*Tadorna tadorna*	337	Sept-March	1000-4000	9900
Eurasian Oystercatcher	*Haematopus ostralegus*	1294	July-April	6000-23000	55602
Eurasian Curlew	*Numenius arquata*	74	July-April	2000-9000	15480
Bar-tailed Godwit	*Limosa lapponica*	0	July-May	600-4500	12246
Grey Plover	*Pluvialis squatarola*	0	Aug-May	300-3000	13611
Dunlin	*Calidris alpina*	0	July-May	600-3000	55230
Red Knot	*Calidris canutus*	0	Jan-Oct	7000-16000	50050
Herring Gull	*Larus argentatus*	10302	Jan-April	1000-6000	28288
Lesser Black-backed Gull	*Larus fuscus*	10679	March-Oct	20-500	21358

Occurrence of bird species identified as posing a special "contact risk with poultry":

Table 3.4: Occurrence of species identified on Schiermonnikoog as posing a special contact risk with poultry. All species mentioned occur on the island year round.

Species		breeding pairs 2001	maximum number
Mallard	*Anas platyrhynchos*	250	2790
Collared Dove	*Streptopelia decaocto*	91	?
Jackdaw	*Corvus monedula*	381	?
Starling	*Sturnus vulgaris*	97	10000
House Sparrow	*Passer domesticus*	230	?

Occurrence of species of high conservation concern:

- Eurasian Spoonbill *Platalea leucorodia* (200 pairs breeding in 2001)
- Hen Harrier *Circus cyaneus* (12 pairs breeding in 2001)

4. Places with high concentrations of vulnerable bird species

Breeding colonies

There are breeding colonies of Eurasian Spoonbill, Black-headed Gull, Common Gull, Herring Gull, Lesser Black-backed Gull and Common Tern in dunes and saltmarsh (see Figure 3.3).

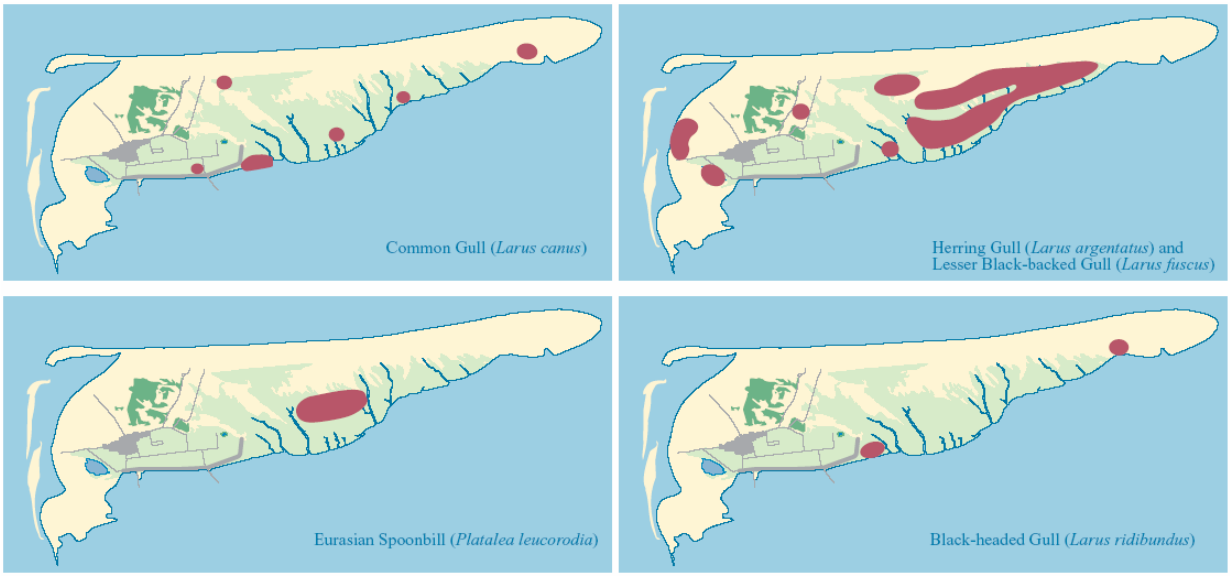


Figure 3.3: Location of main breeding colonies of Common Gull *Larus canus*, Herring Gull *Larus argentatus* and Lesser Black-backed Gull *Larus fuscus* (combined), Eurasian Spoonbill *Platalea leucorodia* and Black-headed Gull *Larus ridibundus* on Schiermonnikoog (period 2001-2005).

Concentrations of resting, foraging or roosting birds

Geese and herbivorous ducks may forage in large groups in the polder and the salt marsh Oosterkwelder. Geese spend the night on the Wadden Sea. Ducks also concentrate at the fresh water lake Westerplas. Especially noteworthy are the concentrations of hundreds of ducks (mainly Mallard) permanently present in the duck decoy. Some of these ducks are (semi)-domesticated.

Species foraging on the tidal flats (mainly Shelduck, shorebirds and gulls) aggregate in numbers up to more than 100,000 individuals on the various high tide roosts of the island (see Figure 3.4).

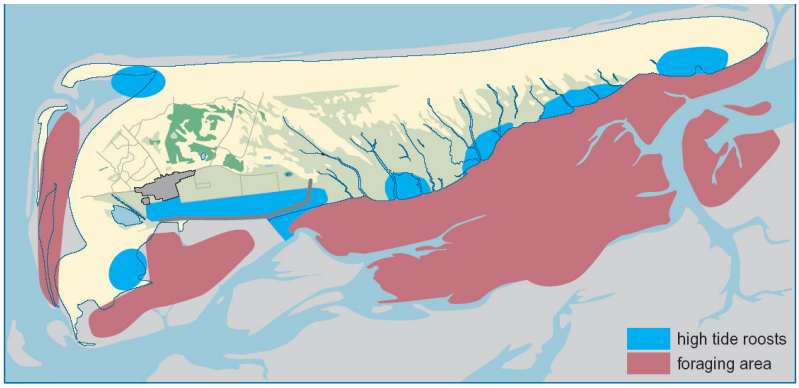


Figure 3.4: Location of high tide roosts and main foraging areas for Common Shelduck *Tadorna tadorna* and shorebirds and gulls *Charadriiformes* on Schiermonnikoog and the adjacent tidal flats of the Wadden Sea.

5. Local movements of vulnerable bird species

Shelduck, shorebirds and gulls typically spread over the tidal flats at low tide, often covering distances of 5 km or more from the high tide roosts. In the non-breeding

season, individuals of most species easily move to other parts of the Wadden Sea, depending on food conditions. In this respect the Wadden Sea should be regarded as an open system in which these species may freely move from one place to another, using high tide roosts on different islands (or on the mainland), see Figure 3.5.

Geese (mainly Barnacle Geese) staging or wintering on the island may perform foraging flights to preferred grazing areas on the mainland (areas inside and near the embanked area Lauwersmeer, and the polder Anjumer Kolken, see Figure 3.5).

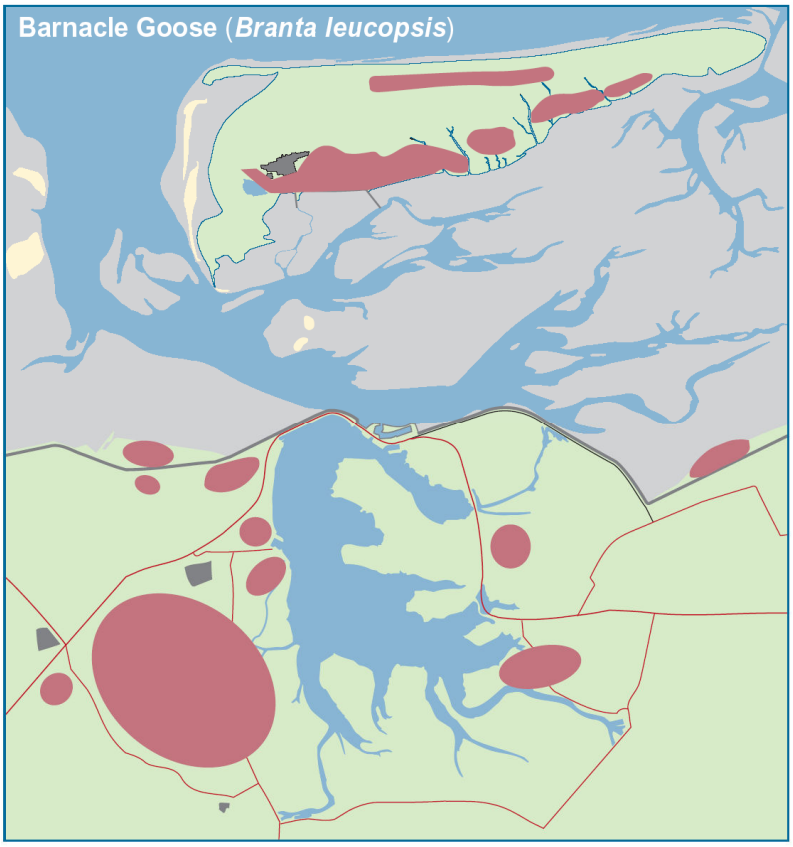


Figure 3.5: Location of main foraging areas on Schiermonnikoog as well as on the mainland, commonly used by the same local population of Barnacle Geese *Branta leucopsis*.

In the period March-May Spoonbills which belong to the local breeding population may forage in ditches in agricultural land in the provinces of Friesland and Groningen, often covering distances of up to 25-30 km.

6. Position of site in flyway and consequences of bird movements for further spread of H5N1

General position in flyway

The National Park Schiermonnikoog is situated in the East Atlantic Flyway which connects arctic breeding grounds of waterbirds in Northern Europe, Siberia, Greenland and East Canada with staging and/or wintering grounds in temperate Europe and sub-tropical and tropical regions (North, West and South Africa). Most waterbird species on Schiermonnikoog follow the coastline, moving in W-SW (205-215 degrees) direction in autumn and in NE-E (25-35 degrees) direction in spring.

Ring recoveries

The EURING database has been searched for direct and indirect ring recoveries for the 17 species analysed in detail in Chapter 2, the results being given in Table 3.5. Maps are presented for Lapwing and Black-headed Gull (see Figure 3.6).

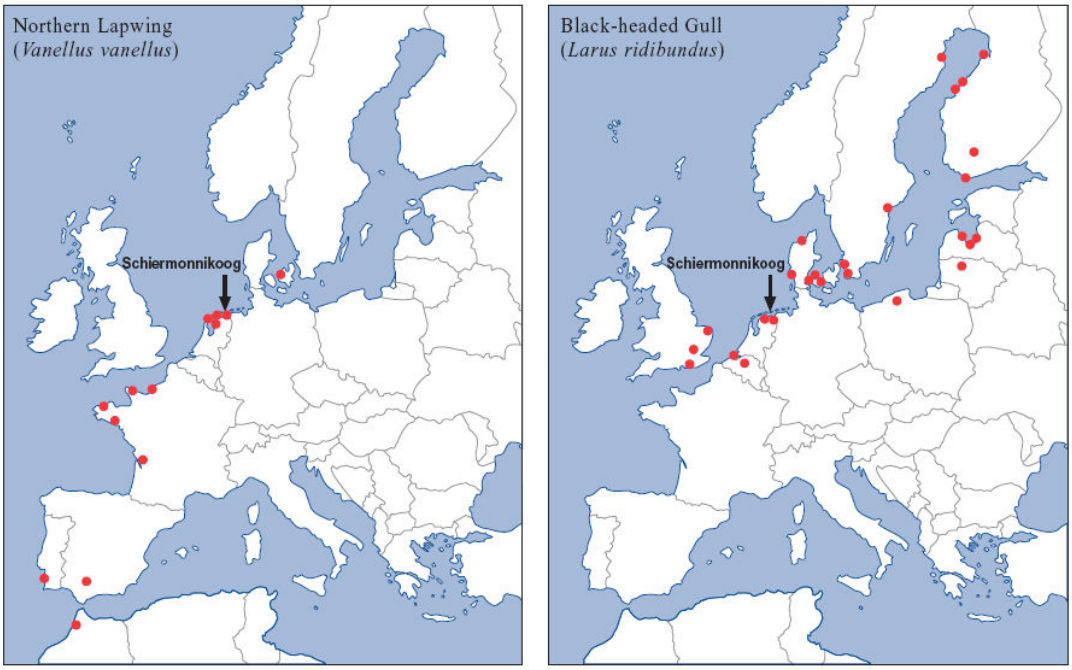


Figure 3.6: Finding locations of Northern Lapwing and Black-headed Gull ringed and recovered at Schiermonnikoog

Table 3.5: Number of direct and indirect ring recoveries for Schiermonnikoog for higher risk species analysed in detail in Chapter 2. (EURING data base).

English name	Latin name	Recoveries
Greater White-fronted Goose	*Anser albifrons*	2
Greylag Goose	*Anser anser*	2
Eurasian Wigeon	*Anas penelope*	5
Common Teal	*Anas crecca*	14
Mallard	*Anas platyrhynchos*	13
Northern Pintail	*Anas acuta*	9
Garganey	*Anas querquedula*	1
Northern Shoveler	*Anas clypeata*	2
Lapwing	*Vanellus vanellus*	55
Black-headed Gull	*Larus ridibundus*	82
	Total	**185**

Recoveries for Greater White-fronted Goose and duck species are few and all situated in NW Europe with five recoveries in autumn and winter from southern UK (Common Teal (1), Mallard (3) and Northern Shoveler (1)). Recoveries for Lapwing and Black-headed Gull are more numerous and fit well with the known main directions of movement within the East Atlantic Flyway (Figure 3.6). For both species, nearly all recoveries are in NE (spring and summer) or SW (autumn and

winter) directions. Again, a number of Black-headed Gulls have been recovered from southern England.

Consequences of bird movements for further spread of H5N1
Shorebird species typically follow the Wadden Sea and any outbreak of H5N1 among these species can be expected to spread within the international Wadden Sea, presumed direction of spread to be determined by species ecology and season.

Shelducks perform moult migration and concentrate in numbers up to 100.000 individuals in the German Wadden Sea in July/August. Eider ducks moult in loose groups more spread out in the Wadden Sea area.

Being rather opportunistic feeders, gulls may visit a variety of habitats, including open sea, beaches, harbours, agricultural fields, open garbage dumps and urban areas (mainly Black-headed Gull). This group may pose a special risk for spreading H5N1 to human settlements, but it is extremely difficult to predict any direction of possible spread by this group.

Geese and herbivorous ducks could probably spread H5N1 to agricultural field or salt marsh areas on other Wadden Sea islands or on the mainland. During severe weather conditions geese may show “frost migration”. Barnacle geese usually migrate to the south of the Netherlands and/or Belgium, whereas Brent Geese may move to southern England (Kent) and France (Cote Picardy and Morbihan).

7. Human use of site and disturbance effects

Access to the public
Schiermonnikoog is a popular destination for tourists, with about 300,000 visitors each year. From 15 April – 15 July the dunes and salt marsh (whole area east of Banckspolder) is closed to the public with the exception of the beaches along the North Sea. Outside the above mentioned period the whole island is open to the public with the exception of part of the dune habitat which is especially vulnerable to erosion.

Hunting regimes
Hunting (mainly Rabbit, Brown Hare, Mallard and Pheasant) is limited to the polder area (260 ha.) and the ridge of dunes nearest to the North Sea, which has a special status for coastal defence (100 ha.). Hunting pressure is low.

Other human usage of site
The Banckspolder is used for farming (7 farms). In part of the Oosterkwelder, extensive cattle, sheep and horse grazing occurs as a vegetation management measure. There is small scale fishing in the creeks of the Oosterkwelder as well. Scientists of Groningen University run several ecological projects on birds, observations focusing on Oosterkwelder and tidal flats. There are two bird ringing stations, the duck decoy (catching of ducks in October-January) and Groenglop (catching of passerines in July - November).

8. Existence of poultry farms within a radius of 10 km of site

Density, location and nature of poultry farms
There are no (semi-) commercial poultry farms on the island, but a number of farms and households keep small numbers of chickens and a few ducks and turkeys. These are partly free roaming although they usually stay in the vicinity of human habitation. At the edge of the village and the polder there is a small public farm which has been especially created for children. The animals present (a dozen chicken, ducks and geese) roam freely within a fenced area and are fed by the public.

Presence of other domesticated animals vulnerable to H5N1
There are numerous domestic cats on the island, some of which have escaped and now live in the wild. A small number of pigs is kept by the municipality in the "children's farm" referred to above. A small number of inhabitants keep domestic goats, sheep or horses.

9. Measures to be considered in case of an outbreak

Monitoring bird mortality
In case of an outbreak of H5N1 monitoring for dead and moribund birds should take place at regular internals (preferably twice a week) and with a focus on higher risk species.

Places to be inspected are:

- preferred foraging areas of geese (Banckspolder, Oosterkwelder)
- preferred foraging/resting areas of ducks (special attention to duck decoy)
- high tide roosts of shorebirds and other species foraging in the marine and littoral zone (inspection of roosting places as well as the high tide line along the dike south of the Banckspolder and the North Sea beach).

Monitoring activities should take place in such a way that disturbance of concentrations of birds is kept to a minimum, i.e. visiting high tide roosts and high tide lines at low tide.

Sampling wild birds for the occurrence of AI
The duck decoy, which is well equipped for catching ducks (ringing program) offers a unique possibility to catch and sample Mallard and to a lesser extent also Northern Pintail, Eurasian Wigeon and Common Teal for AI virus analysis. The duck decoy is already involved in the Dutch AI sampling program.

Restrictions with respect to human activities in and near site
Restrictions should aim at minimizing the risk of further spread of H5N1, *inter alia* through avoiding disturbance of wild birds.

Measures to be considered are:

- closing parts of the island to the public (Oosterkwelder, Westerplas, beaches, part of Wadden Sea area)

- closing Berkenplas (fresh water pool in dunes) for swimming
- ban on hunting and bird catching/ringing activities
- ban on collecting eggs of Northern Lapwing (March-April)
- closing of the children's farm
- keeping cats indoors
- keeping racing pigeons indoors
- ban on feeding birds in the village (it often attracts Black-headed Gulls)
- avoiding access of gulls to garbage (transhipment dump and garage barrels in national park)
- restrictions with respect to the keeping and transport of poultry (conform national/EU guidelines)
- restrictions with respect to the keeping of other vulnerable domesticated animals (conform national/EU guidelines)
- informing the public (announcements on ferry, in hotels, on concentration points for recreation and information leaflets distributed to all inhabitants).

A surveillance system should be put in place as well for some neighbouring sites, such as the islands of Ameland and Rottumerplaat, the Lauwersmeer and surrounding polders (concentrations of geese) and part of the Wadden Sea coast of Groningen and Friesland.

10. Data sources

- Stuurgroep Avifauna Schiermonnikoog 2005 (redactie). Vogels van Schiermonnikoog. Uniepers, Abcoude.
- SOVON (databases waterbird monitoring Wadden Sea)
- Wetlands international (International Waterbird Census database)
- Vereniging Natuurmonumenten (management plans, databases breeding and migratory birds)
- Stichting Nationaal Park Schiermonnikoog
- Ebbinge, B.S., G.J.D.M. Müskens, J.G. Oord, A.J. Beintema & N.W. van den Brink; Stuurbaarheid van ganzen door verjaging en flankerende jacht rondom het ganzenopvanggebied Oost-Dongeradeel (Friesland) in 1999-2000.; gepubliceerd: 05 okt 2000; 99 pp.
- Otto Overdijk, manager Nationaal park Schiermonnikoog on behalf of Natuurmonumenten.

3.3.2 Camargue (Rhône delta), France

1. General information

Name of site: Camargue (Rhône Delta)
Country: France
Coordinates: 43° 20'- 43° 43' N / 04° 06'- 04° 51' E
Size: 145,300 ha
Managing organizations: Conseil Général des Bouches-du-Rhône, Conseil Général du Gard, SNPN, Conservatoire du Littoral, Parc Naturel Régional de Camargue, Station Biologique de laTour du Valat, Les Salins

2. Short description of the site

Topography
The Camargue, situated in the south of France, extends over an area of 145,300 hectares, between the gulfs of Aigues-Mortes in the west and Fos-sur-Mer in the east (see Figure 3.7). The base of the delta is formed by 80km of sandy beach. The central artery, the Rhône, divides into two arms near the town of Arles; the Grand Rhône, which drains 85% of the land, and the Petit Rhône, which only drains the remaining 15% and tends to silt up at its mouth. These two arms divide the Camargue into three sectors (from west to east, see Figure 3.7): the Petite Camargue, the Grande Camargue (or Ile de la Camargue) and the Plan du Bourg. There is a network of roads connecting the many farms, small villages and towns in the area. The town of Arles (50.000 inhabitants) is situated at the head of the delta.

Figure 3.7: Topography of the Camargue

Habitat types
The Camargue is of recent alluvial origin, gently sloping from north to south. The northern part of the area (north of the Étang du Vaccarès) is characterized by a series of alluvial ridges of riverine origin with fresh water marshes situated between the ridges. The central part is largely covered by lagoons of varying salinity. The southern part, which is periodically flooded, is characterized by saline lagoon systems, formed by the sea. Habitat types are largely determined by hydrological regime (degree of flooding) and salinity.

The following types can be distinguished:

- salt marshes and brackish lagoons
- freshwater marshes
- woodland
- meadows
- sandy beaches
- reed beds
- bare ground or salt-steppe, dry in summer and flooded in winter
- cultivated areas

The area under cultivation covers ca. 50.000 ha and consists mainly of rice and wheat fields, vineyards, horticulture and arboriculture. In large parts of the area there is extensive grazing by cattle, horses and sheep.

Water depth, water temperature and hydrology
The Ile de Camargue, which is situated between the two arms of the Rhône, is completely surrounded by dikes, both along the course of the river and along the sea coast. To serve the needs of agriculture, hunting and nature protection water levels are managed by a combination of irrigation and drainage: each year about 400 million m3 of river water is pumped into to the area and distributed through a system of channels, whereas about 200 million m3 is drained away. The area is divided into six compartments in order to facilitate water level regulation.

3. Occurrence of vulnerable bird species at the site

Numbers and seasonal presence of higher risk species
Generalized figures of higher risk species in all months of the year are given in Table 3.6, showing that several duck species, Black-tailed Godwit, Ruff and Black-headed Gull may occur in numbers exceeding 10,000 individuals. For a long period of time, aerial counts have been made of swans, geese, ducks, coot and Black-tailed Godwit in the period September-March. The results of the most recent count (season 2005-2006) are presented in Table 3.7, showing that the total number of ducks, most of which are higher risk species, may exceed 100,000 individuals.

Table 3.6: Numbers of higher risk species occurring in the Camargue in all months of the year. Numbers are generalized and based on counts over a period of several decades. They should be read as follows: 1 = 1-10, 10 = 10-100, 100 = 100-1000, etc. For more information on recent counts of swans, geese and ducks, see Table 3.7.

English name	Latin name	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Bewick's Swan	*Cygnus columbianus*	10	10	10	0	0	0	0	0	0	10	10	10
Mute Swan	*Cygnus olor*	100	100	100	100	10	10	10	100	100	100	100	100
Greylag Goose	*Anser anser*	100	100	1	1	1	1	1	1	1	100	100	100
Eurasian Wigeon	*Anas penelope*	1000	1000	1000	10	0	0	0	10	100	1000	1000	1000
Common Teal	*Anas crecca*	10000	1000	1000	10	1	1	100	1000	1000	10000	10000	10000
Mallard	*Anas platyrhynchos*	10000	1000	1000	1000	1000	1000	1000	10000	10000	10000	10000	10000
Northern Pintail	*Anas acuta*	1000	1000	100	10	0	0	0	10	100	100	1000	1000
Garganey	*Anas querquedula*	0	10	1000	1000	10	1	1	1000	1000	10	0	0
Northern Shoveler	*Anas clypeata*	1000	1000	1000	1	1	1	1	100	1000	1000	1000	1000
Red-crested Pochard	*Netta rufina*	1000	1000	100	100	100	100	100	100	100	100	1000	1000
Common Pochard	*Aythya ferina*	1000	1000	100	1	1	1	1	1	1000	10000	10000	1000
Tufted Duck	*Aythya fuligula*	1000	1000	100	1	0	0	0	0	10	10	100	1000
Northern Lapwing	*Vanellus vanellus*	1000	1000	1000	10	10	10	10	10	10	1000	1000	1000
Eurasian Golden Plover	*Pluvialis apricaria*	100	100	100	1	0	0	0	10	10	10	100	100
Black-tailed Godwit	*Limosa limosa*	1	1000	10000	1000	10	10	10000	10000	100	10	1	1
Ruff	*Philomachus pugnax*	10	100	1000	10000	1000	1	10	100	100	100	10	10
Black-headed Gull	*Larus ridibundus*	10000	10000	10000	1000	1000	1000	1000	1000	1000	10000	10000	10000
Common Gull	*Larus canus*	10	10	10	1	1	1	1	1	1	1	1	10

Table 3.7: Number of ducks counted in winter in the Camargue by aerial census: A. Number of ducks per month in the winter 2005-2006, B-D respectively show mean, minimum and maximum numbers per month for the period 1964-2001.

A. Census results 2005-2006

		Sept.	**Oct.**	**Nov.**	**Dec.**	**Jan.**	**Feb.**	**March**
		2005	**2005**	**2005**	**2005**	**2006**	**2006**	**2006**
Bewick's Swan	Cygnus columbianus				81	101	80	
Mute Swan	Cygnus olor	950	560	720	570	690	500	480
Greylag Goose	Anser anser	85	1 100	1 350	1 800	2 950	1300	4
Eurasian Wigeon	Anas penelope	701	5700	6500	10700	13300	10250	4100
Common Teal	Anas crecca	12100	42500	38940	35200	25700	19000	11400
Mallard	Anas platyrhynchos	31600	36300	36600	26400	36300	24500	7400
Gadwall	Anas strepera	4400	9200	10400	15400	18600	23600	10400
Northern Pintail	Anas acuta	70	500	1800	1700	730	700	400
Northern Shoveler	Anas clypeata	3100	10450	10100	10800	9300	13500	10500
Red-crested Pochard	Netta rufina	1100	1100	1500	2100	4500	3600	2200
Common Pochard	Aythya ferina	450	13500	11100	10400	8900	5600	1000
Tufted Duck	Aythya fuligula	0	0	50	400	1000	900	1000
Ducks (unidentified)		1500	2300	9000	1800	2400	1800	1000

B. Mean number 1964-2001

		Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
Eurasian Wigeon	Anas penelope	200	3 400	9 200	12 700	11 400	9 100	1 900
Common Teal	Anas crecca	13 500	25 500	33 600	34 500	25 000	12 600	3 900
Mallard	Anas platyrhynchos	30 000	27 300	26 800	25 100	19 400	11 700	3 500
Gadwall	Anas strepera	1 100	3 300	8 600	9 200	8 600	5 100	1 700
Northern Pintail	Anas acuta	50	650	1 590	1 600	1 600	1 200	420
Northern Shoveler	Anas clypeata	2 500	5 400	8 000	8 200	7 600	7 000	5 600
Red-crested Pochard	Netta rufina	400	400	2 100	2 900	2 900	2 800	1 500
Common Pochard	Aythya ferina	1 300	4 100	9 100	8 200	7 100	4 800	1 600
Tufted Duck	Aythya fuligula	0	10	500	1 300	2 600	3 600	1 500
Ducks total (incl. non-identified)		49 000	74 500	104 300	108 000	90 300	60 600	22 800

C. Minimum number 1964-2001

		Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
Eurasian Wigeon	Anas penelope	0	370	3600	4700	150	4100	50
Common Teal	Anas crecca	4700	11300	18800	11200	250	2900	1200
Mallard	Anas platyrhynchos	12700	8200	7000	10700	1900	4700	500
Gadwall	Anas strepera	0	300	800	1700	0	1000	400
Northern Pintail	Anas acuta	0	0	0	170	0	50	0
Northern Shoveler	Anas clypeata	0	950	2500	3100	50	2400	1700
Red-crested Pochard	Netta rufina	100	20	0	300	250	700	200
Common Pochard	Aythya ferina	10	100	1100	3000	0	500	0
Tufted Duck	Aythya fuligula	0	0	0	0	0	300	110
Ducks total (incl. non-identified)		25000	37300	?	56700	3100	30300	9000

D. Maximum number 1964-2001

		Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
Eurasian Wigeon	Anas penelope	1700	10200	23500	22800	22700	17200	5800
Common Teal	Anas crecca	28000	45300	53900	66100	47600	33000	7000
Mallard	Anas platyrhynchos	74000	62500	50500	47700	43200	23700	10600
Gadwall	Anas strepera	5200	8200	19600	17100	16000	10100	5300
Northern Pintail	Anas acuta	400	5900	5100	9400	6300	4100	2800
Northern Shoveler	Anas clypeata	5900	15600	15900	18500	15800	13600	11600
Red-crested Pochard	Netta rufina	2400	3600	7450	6900	5500	5900	4200
Common Pochard	Aythya ferina	4700	37000	27900	20800	20200	13100	5900
Tufted Duck	Aythya fuligula	5	195	6500	7100	7500	13300	5300
Ducks total (incl. non-identified)		89800	121900	?	168700	142800	112700	45000

Presence of other waterbird species which occur in large numbers

Generalized figures of other waterbird species occurring in the area in numbers exceeding 1000 (in any month of the year) are given in Table 3.8. Especially abundant (more than 10,000 individuals) are Greater Flamingo, Common Coot, Little Stint, Dunlin and Yellow-legged Gull.

Table 3.8: Numbers of other waterbird species occurring in the Camargue in numbers exceeding 1000 individuals in any one month of the year. Numbers are generalized and based on counts over a period of several decades. They should be read as follows: 1 = 1-10, 10 = 10-100, 100 = 100-1000, etc.

English name	Latin name	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Great Crested Grebe	*Podiceps cristatus*	1000	1000	1000	1000	100	100	100	100	100	1000	1000	1000
Great Cormorant	*Phalacrocorax carbo*	1000	1000	1000	10	1	1	1	10	10	1000	1000	1000
Cattle Egret	*Bubulcus ibis*	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Little Egret	*Egretta garzetta*	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Grey Heron	*Ardea cinerea*	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Purple Heron	*Ardea purpurea*	0	0	100	1000	1000	1000	1000	1000	1000	10	0	0
Greater Flamingo	*Phoenicopterus ruber*	1000	1000	10000	10000	10000	10000	10000	10000	10000	10000	1000	1000
Shelduck	*Tadorna tadorna*	100	1000	1000	100	100	100	100	1	100	1000	1000	100
Gadwall	*Anas strepera*	1000	1000	1000	1	1	1	1	10	1000	1000	1000	1000
Water Rail	*Rallus aquaticus*	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Moorhen	*Gallinula chloropus*	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Common Coot	*Fulica atra*	10000	1000	1000	1000	1000	1000	1000	1000	10000	10000	10000	10000
Little Ringed Plover	*Charadrius dubius*	1	1	1000	1000	100	1	1000	1000	1000	100	1	1
Great Ringed Plover	*Charadrius hiaticula*	10	10	100	1000	1000	10	10	1000	1000	1000	10	10
Kentish Plover	*Charadrius alexandrinus*	100	100	100	100	100	100	100	1000	1000	100	100	100
Grey Plover	*Pluvialis squatarola*	100	100	100	1000	100	100	100	100	1000	100	100	100
Curlew Sandpiper	*Calidris ferruginea*	0	0	0	1000	1000	10	1000	1000	1000	10	0	0
Little Stint	*Calidris minuta*	100	100	100	100	1000	10	10	10000	10000	1000	1000	100
Sanderling	*Calidris alba*	10	10	10	1000	1000	100	10	10	10	10	10	10
Dunlin	*Calidris alpina*	1000	1000	10000	10000	1000	100	100	100	1000	10000	1000	1000
Common Snipe	*Gallinago gallinago*	1000	1000	1000	100	1	0	0	1	1000	1000	1000	1000
Common Greenshank	*Tringa nebularia*	1	1	10	1000	1000	10	100	1000	1000	100	10	1
Spotted Redshank	*Tringa erythropus*	10	10	10	1000	1000	1	100	1000	1000	100	10	10
Green Sandpiper	*Tringa ochropus*	10	10	10	100	10	100	1000	1000	100	100	10	10
Common Sandpiper	*Actitis hypoleucos*	1	1	1	100	100	1	1000	1000	100	1	1	1
Wood Sandpiper	*Tringa glareola*	0	0	10	1000	100	10	1000	1000	1000	100	1	0
Yellow-legged Gull	*Larus cachinnans*	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
Mediterranean Gull	*Larus melanocephalus*	100	100	1000	1000	1000	1000	1000	1000	100	100	100	100
Sandwich Tern	*Sterna sandvicensis*	100	100	100	100	100	100	100	100	100	1000	100	100
Black Tern	*Chlidonias niger*	1	1	1	1000	1000	10	1000	1000	1	1	1	1

Occurrence of bird species identified as posing a special "contact risk with poultry"

Generalized figures of species posing a "special contact risk with poultry" and occurring in numbers exceeding 1000 (in any month of the year) are given in Table 3.9. Wood Pigeon, Eurasian Jackdaw, Common Starling, Tree Sparrow and House Sparrow occur in numbers exceeding 10,000 individuals.

Table 3.9: Occurrence of species suspected of posing a special "contact risk with poultry" in the Camargue in all months of the year. Numbers are generalized and based on counts over a period of several decades. They should be read as follows: 1 = 1-10, 10 = 10-100, 100 = 100-1000, etc. For more information on recent counts of swans, geese and ducks, see Annex 1.

English name	Latin name	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Cattle Egret	*Bubulcus ibis*	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Mallard	*Anas platyrhynchos*	10000	1000	1000	1000	1000	1000	1000	10000	10000	10000	10000	10000
Black-headed Gull	*Larus ridibundus*	10000	10000	10000	1000	1000	1000	1000	1000	1000	10000	10000	10000
Yellow-legged Gull	*Larus cachinnans*	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
Common Pheasant	*Phasianus colchicus*	1000	1000	100	100	100	100	100	1000	1000	1000	1000	1000
Wood Pigeon	*Columba palumbus*	1000	1000	1000	100	100	100	100	100	1000	10000	10000	1000
Feral Pigeon	*Columba livia*	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Collared Dove	*Streptopelia decaocto*	100	100	100	100	100	100	100	100	100	100	100	100
Magpie	*Pica pica*	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Carrion Crow	*Corvus corone*	1000	1000	100	100	100	100	100	100	100	1000	1000	1000
Eurasian Jackdaw	*Corvus monedula*	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
Common Starling	*Sturnus vulgaris*	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
Tree Sparrow	*Passer montanus*	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
House Sparrow	*Passer domesticus*	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000

Occurrence of species of high conservation concern

Greater Flamingo breeds in the Camargue in numbers up to 15.000 pairs, which is about 50% of the European population. Any outbreak of H5N1 in the breeding colony could be disastrous for the European population. Breeding colonies of Eurasian Spoonbill, Glossy Ibis and Squacco Heron are regarded of special conservation concern as well.

4. Places with high concentrations of vulnerable bird species

Breeding colonies

The Camargue hosts large numbers of colonially breeding waterbirds, such as Greater Flamingo, herons, egrets, Pied Avocet, gulls and terns (see Table 3.10). During the past decades Greater Flamingos have bred in Etang du Fangassier. Most other species show less site fidelity and often change breeding places between years. Such movements depend on environmental conditions such as flooding, food situation and disturbance. Locations of breeding colonies and breeding numbers are assessed each year by the Station Biologique de la Tour du Valat.

Table 3.10: Colonial breeding birds (in pairs) of the Camargue in 2001 and 2002

English name	Latin name	2001	2002
Night Heron	*Nycticorax nycticorax*	380	525
Cattle Egret	*Bubulcus ibis*	5100	3700
Squacco Heron	*Ardeola ralloides*	338	312
Little Egret	*Egretta garzetta*	4750	3700
Great white Egret	*Egretta alba*		16
Grey Heron	*Ardea cinerea*	1163	1867
Purple Heron	*Ardea purpurea*	900	>600
Greater Flamingo	*Phoenicopterus ruber*	10.000	13.000
Avocet	*Recurvirostra avosetta*	301	186
Black-headed Gull	*Larus ridibundus*	968	1276
Slender-billed Gull	*Larus genei*	877	659
Mediterranean Gull	*Larus melanocephalus*	1932	1719
Yellow-legged Gull	*Larus cachinnans*	>6000	>6000
Common Tern	*Sterna hirundo*	563	619
Sandwich tern	*Sterna sandvicensis*	1130	1294
Little Tern	*Sterna albifrons*	83	183
Gull-billed Tern	*Gelochelidon nilotica*	337	418

Concentrations of resting, foraging or roosting birds

In the non-breeding period, large numbers of ducks and Common Coot (up to more than 100,000 individuals, see Table 3.7) concentrate in daytime in the various lake systems within the area (especially Ligagneau-Vigueirat marshes in Plan du Bourg, Tour du Valat (St. Seren), the Vaccarès and Consécanière in the Ile de Camargue). Greater Flamingos winter in all of these areas and in the lower salinity saltpans. The exact locations where major concentrations of waterbirds are found may change from year to year and even from month to month. Greater Flamingos, swans, geese, ducks and Common Coot are counted by aerial census on a monthly basis by staff members of the Station Biologique de la Tour du Valat.

5. Local movements of vulnerable bird species

There are many local movements of waterbirds within the area which, however, very much depend on food availability and thus change from year to year and between seasons. Most prominent are movements of swans and geese between foraging areas (agricultural fields and natural land habitat) and night roosts (on water bodies). Ducks have a reversed diurnal rhythm, often being present on and alongside the lakes by day,

and performing foraging flights at night to feeding grounds (agricultural fields and marshes) as far as some tens of km away. Herons and egrets spread over marshes and water bodies in daytime, usually roosting together in trees. Gulls spread over a variety of habitats, including urban areas (refuse dumps) and spend the night on open water. The Greater Flamingo performs foraging flights from the colony up to 50 km away to the Petit Camargue and Languedoc.

6. Position in flyway and consequences of bird movements for further spread H5N1

General position in flyway
The Camargue is host to large numbers of birds throughout the year, most species being migrants. The area is quite centrally-placed within the African-Eurasian region. Ducks and shore-birds come from Northern Europe and Asia to winter in the Camargue and elsewhere in the western Mediterranean, more than 30 species of shorebirds transit the area twice a year moving between destinations as far apart as Siberia and southern Africa while others, such as the Greater Flamingo, move around the Mediterranean and West Africa, making the Camargue the most northerly part of their range.

Consequences of bird movements for further spread of H5N1
The migrant species occurring in the Camargue cross the European continent in spring on their way north and in autumn, on their way south, they either cross the Mediterranean Sea or the Iberian Peninsula. Any outbreak of H5N1 among migrant species could be expected to spread to other areas, these depending on the species' ecology and season.

Shelducks from the Camargue perform moult migration (June-August) to the German Wadden Sea, returning south again in winter.

Being rather opportunistic feeders, gulls may visit a variety of habitats, including open sea, beaches, harbours, agricultural fields and urban areas, in particular rubbish dumps. Waste from the city of Marseille is deposited at Entressen, close to the Camargue, this being the largest open air dump in Europe. Gulls may pose a special risk for spreading H5N1 to human settlements.

Ring recoveries
The EURING database has been searched for direct and indirect ring recoveries for the 17 species analysed in detail in Chapter 2, the results being given in Table 3.11. Maps are presented for Gadwall, Common Teal, Common Pochard and Black-headed Gull (see Figure 3.8).

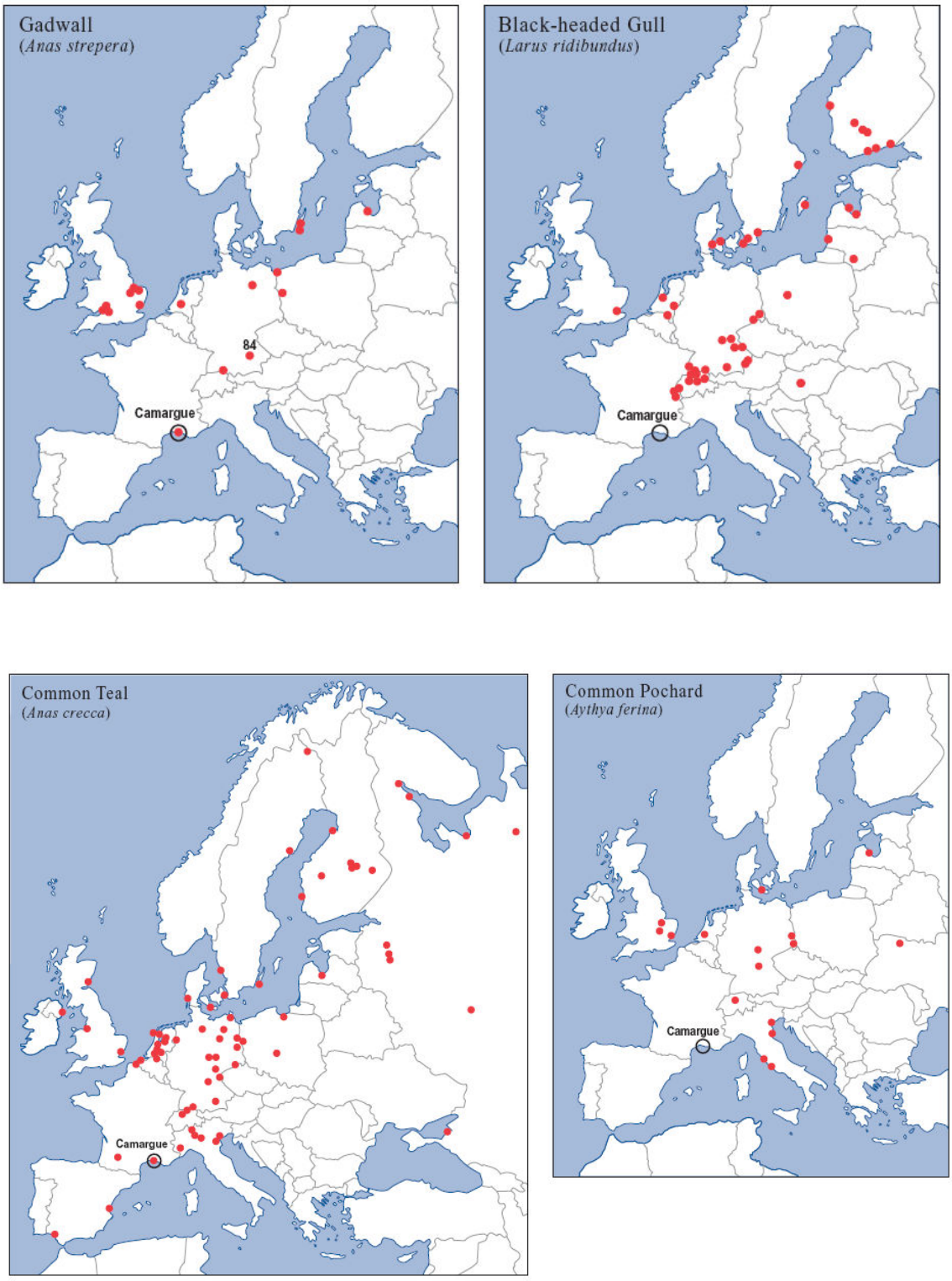


Figure 3.8: Direct and indirect ring recoveries for Gadwall *Anas strepera*, Common Teal *Anas crecca*, Common Pochard *Aythya ferina* and Black-headed Gull *Larus ridibundus* ringed or found in the Camargue (EURING database).

Table 3.11: Number of direct and indirect recoveries involving the Camargue for higher risk species analysed in detail in Chapter 2. (EURING data base).

English name	Latin name	Recoveries
Mute Swan	Cygnus olor	20
Greater White-fronted Goose	Anser albifrons	1
Greylag Goose	Anser anser	1
Eurasian Wigeon	Anas penelope	5
Gadwall	Anas strepera	104
Common Teal	Anas crecca	198
Mallard	Anas platyrhynchos	31
Northern Pintail	Anas acuta	18
Garganey	Anas querquedula	16
Northern Shoveler	Anas clypeata	46
Red-crested Pochard	Netta rufina	25
Common Pochard	Aythya ferina	43
Tufted Duck	Aythya fuligula	18
Lapwing	Vanellus vanellus	15
Black-headed Gull	Larus ridibundus	94
Black Tern	Chlidonias niger	1
	Total	**636**

For nearly all species (also those not depicted in Figure 3.8) recoveries are widespread but restricted to Europe, with a relatively small number of recoveries from European Russia (Greater White-fronted Goose (1), Mallard (1), Common Teal (9), Eurasian Wigeon (2), Northern Pintail (2), Northern Shoveler (2) and Tufted Duck (1)). Three data points (Eurasian Wigeon (2) and Northern Pintail (1)) are situated in the well-known moulting areas for ducks in the Volga Delta, northern Caspian Sea.

The data for Gadwall, Common Teal, Common Pochard and Black-headed Gull (Figure 3.8) nicely demonstrate the connections between the Camargue and a large number of sites all over Europe.

It should be noted that ring recoveries depend very much on human population density and the likelihood that rings found will be reported. This might explain the absence of recoveries for ducks from well-known wintering sites in North Africa, especially the southern Mediterranean Coast, as well as from arctic and boreal breeding grounds in Asia.

7. Human use of site and disturbance effects

Over one million tourists visit the Camargue each year, mainly from Easter through to the end of summer. During the summer, visitors are concentrated on the beaches wherever there is access to the sea. There is considerable leisure activity related to the cattle and horses of the Camargue and the area is also a mecca for naturalists. Several parks and reserves allow the public to approach wildlife.

Access to the public
Much of the Camargue is out of bounds to the public being situated within reserves. Furthermore, there are private estates or properties not accessible to the public. However, visitor facilities are available in various places with nature trails, hides etc.

Hunting regimes
Hunting pressure is high outside of the reserved areas (waterfowl, wild boar, rabbits).

Other human usage of site
Reed cutting
Fishing
Ricefields
Cattle and horses

8. Existence of poultry farms within a radius of 10 km of the site

Density, location and nature of poultry farms
No poultry farms. Few farms for ducks and pheasants to be released for hunting.
Households may keep small numbers of chicken (and a few ducks and turkeys).
Hunters use domestic ducks as decoys to attract wild ducks.

Presence of other domesticated (and wild) animals vulnerable to H5N1
Dogs (especially hunting dogs), cats in villages, Wild boar, Coypu are abundant and tame.

9. Measures to be considered in case of an outbreak

Monitoring bird mortality (when and where)
In case of an outbreak of H5N1 monitoring for dead and moribund birds should take place at regular intervals (preferably twice a week) and with a focus on higher risk species. Monitoring activities should take place in such a way that disturbance of concentrations of birds is kept to a minimum. If an outbreak occurs in summer, places to be inspected should include the flamingo colony in the Salins de Giraud which could only be done by the Tour du Valat team in association with the salt company, and the colonies of tree-nesting herons which are all on private land. In winter, inspections should focus on concentrations of swans, geese, ducks and common Coot, places to be chosen on the basis of the most recent aerial survey.

Sampling wild birds for the occurrence of AI (where, which species)
The duck traps on the Tour du Valat are already being used to sample for AI virus and for ringing surface-feeding ducks. This should be continued and intensified in case of an outbreak.

Restrictions with respect to human activities in and near site (hunting ban, closed areas, restrictions for keeping domesticated animals, etc.)
Restrictions should aim at minimizing the risk of further spread of H5N1, *inter alia* through avoiding disturbance of wild birds.

Measures to be considered include:

- Closing part of the area to the public and minimizing other human use as far as this may disturb bird concentrations
- Ban on hunting
- Restrictions with respect to the keeping and transport of poultry (conform with national/EU guidelines)
- Restrictions with respect to the keeping of other vulnerable domesticated animals (conform with national/EU guidelines)

10. Data sources

- Ornithological databases of the Station Biologique de la Tour du Valat.
- Isenmann P. 2004/ Les Oiseaux de Camargue et leurs habitats. Une histoire de cinquante ans 1954-2004. Buchet-Chastel, Paris.
- Tamisier, A. & Dehorter, O. 1999. Camargue Canards et Foulques: fonctionnement et devenir d'un prestigieux quartier d'hiver. C.O.Gard, Nimes.
- Rocamora, G. 1994. Les Zones Importantes pour le Conservation des Oiseaux en France. Ministère de l'Environnement, BirdLife International, LPO.

3.3.3 Eastern Sivash, Crimea Autonomous Republic, Ukraine

1. General information

Name of site: Eastern Sivash (part of Sivash Lake)
Country: Crimea Autonomous Republic, Ukraine
Coordinates: N 45.255754 - 46.184015° – E 34.389325 - 35.470045°
Size: 1 650 km^2 (165 000 ha)
Managing organization: none

2. Short description of the site

Topography
The Eastern Sivash is the largest part of the Sivash Lake (Figure 3.8). It lies to the south of the town of Genichesk and includes parts of Novotroitsky and Genichesk Rayons (Kherson Oblast), and parts of Dzhankoy, Nyzhnyogirsky, Sovetsky, Kirovsky and Leninsky Rayons (Crimea Autonomous Republic). The Eastern Sivash covers much of the west coast of the Azov Sea on the north-eastern coast of the Crimean Peninsula. All the different parts of the Eastern Sivash are joined together by a system of narrow straits, and one strait in the east unites it with the Azov Sea. The bay is shallow, saltwater, with an indented, mostly low-lying shoreline and numerous spits and islets, as well as a large number of saline lowlands and peninsulas. It is separated from the Azov Sea by a large, low-lying peninsula (Arabatska Spit), and has only one narrow connection to the Azov Sea.

Habitat types
The main habitat types found in the Eastern Sivash are:

- Shallows and mud flats (situated along the coast line; mud flats are frequently flooded or exposed under the influence of strong winds);
- Reed beds (mainly in shallow bays with constant or seasonal inflow of fresh water);
- Sandy (or shell) banks, beaches and islets that cut smaller lagoons and bays off from the main water area of the Sivash;
- Salt marshes in the depressions around the shallows and mud flats;
- Pastures, which generally surround fields or salt marshes;
- Agricultural fields (winter wheat, various crops) situated on the highest patches of the terrain, most of them irrigated;
- Rice fields with dense network of irrigation canals make a distinctive artificial habitat type.

Water depth, water temperature and hydrology
Waters of the Sivash Lake are generally shallow and rarely reach depths of 1.5- 2 m, but water level varies considerably, depending on the season (in spring it is generally higher) or time of day and/or wind force and direction. Fluctuations of water level may range up to 1 m. Extensive areas are intermittently flooded or exposed under the influence of strong winds. Just within several hours water is brought from one part of the water body to another. Some shallows totally dry up during the hot season. Canals

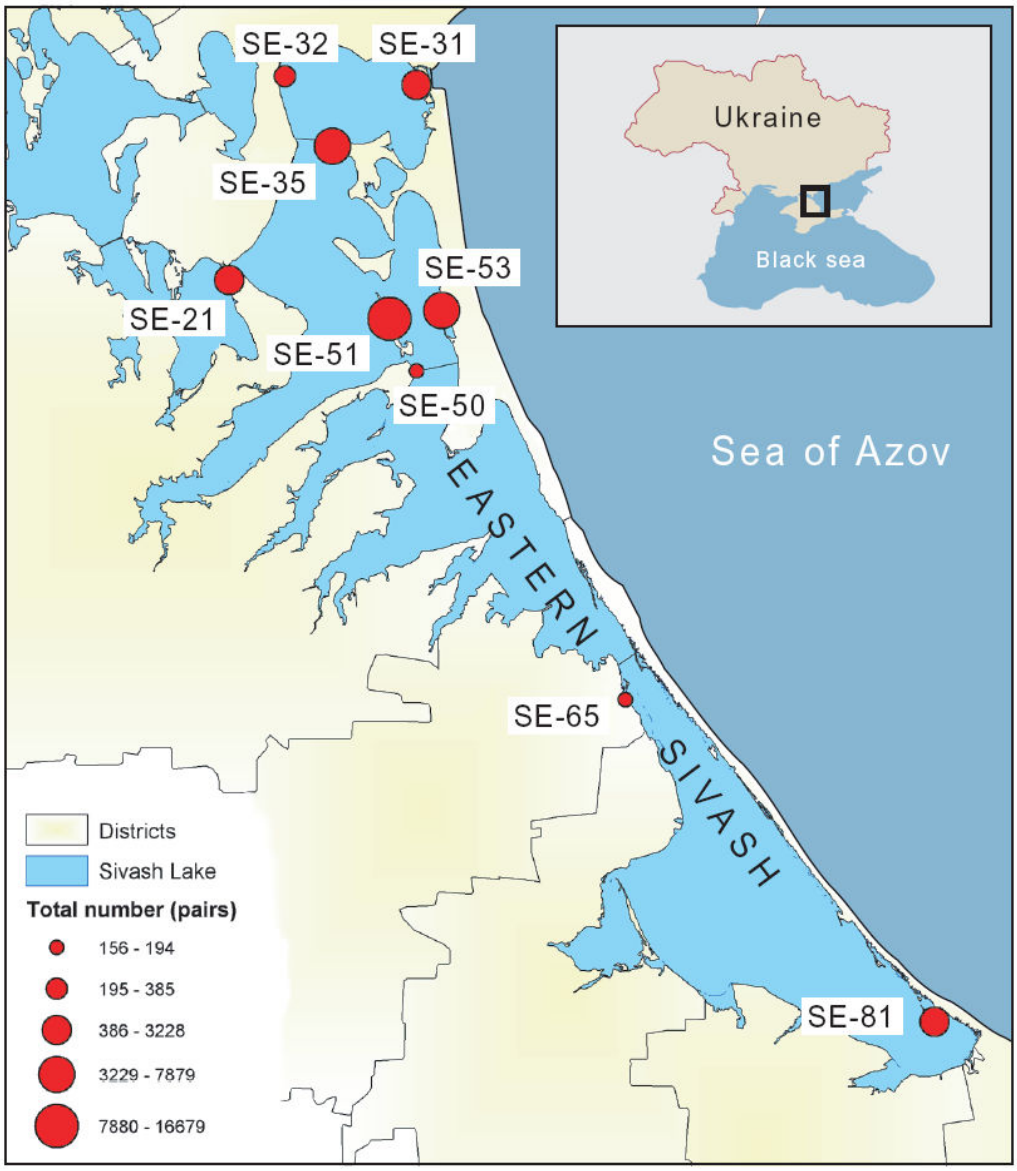


Figure 3.8: Topography and location of the Eastern Sivash, and locations and sizes of principal waterbird colonies

bring irrigation or drainage water to most bays. Salinity of water is generally lower at the outlets of the canals. In summer, water temperatures may rise in shallows up to 27-30 degrees C. In extremely severe winters the water area becomes totally frozen, while normally it stays clear of ice. Water temperatures in normal winters are around 0 - + 5 degrees C.

3. Occurrence of vulnerable bird species at the site

Numbers and seasonal presence of higher risk species:

Table 3.12: Numbers and seasonal presence of higher risk species occurring in relatively large numbers in the Eastern Sivash. Numbers were derived from all available complete counts carried out in the period 1991-2005. For species that were likely to be undercounted, an upper limit estimate of numbers is provided (W – winter(ing), M - migration).

Species	Status			Breeding 1998 (pairs)	Migration or wintering (individuals)				
					Period	Average	Min	Max	Upper estimate
Mute Swan	B	M	W	42	Aug-March	3104	205	14510	30000 (W)
Greater White-fronted Goose		M	W	0	Oct-Febr	23940	1784	80000	200000 (M)
Greylag Goose	B	M	W	30-50	Oct-Febr	946	20	3135	22000 (M)
Red-breasted Goose		M	W	0	Nov-March	4066	2	17070	22000 (W)
Eurasian Wigeon		M	W	0	Oct-March	2129	15	6810	65000 (M)
Common Teal		M		0	Aug-Nov March-Apr	9736	679	35593	
Mallard	B	M	W	438-633	Sept-Apr	23966	657	52649	65000 (W)
Northern Pintail		M	W	0	Oct-Apr	2799	4	16596	35000 (M)
Garganey		M		0	Aug-Nov March-Apr	19785	1527	42893	
Northern Shoveler	B	M		13-20	Aug-Nov March-Apr	7183	99	39890	
Red-crested Pochard	B	M	W	72-128	Aug-April	2796	53	10000	
Common Pochard	B	M	W	304-901	Aug-April	10730	26	78433	120000 (W)
Tufted Duck		M	W	0	Oct-March	25400	11	139189	
Northern Lapwing	B	M	W	303-369	Aug-Nov March-Apr	722	59	1425	
Black-tailed Godwit		M		0	Aug-Sept Apr-May	2163	250	6584	
Ruff		M		0	March-May Aug-Oct	68355	39	181770	
Black-headed Gull		M		0	March-Apr Aug-Oct	11200	343	35372	
Common Gull		M	W	0	Oct-Apr	1097	210	2221	

Presence of other waterbird species which occur in large numbers:

Table 3.13: Numbers and seasonal presence of other waterbird species occurring in relatively large numbers in the Eastern Sivash. Numbers were derived from all available complete counts carried out in different seasons in 1991-2005. For species that were likely to be undercounted an upper limit estimate of numbers is provided. B = breeding, M = migrating, W = wintering. Only species that yield a total of over 1000 on at least one seasonal count are included.

Species	Status	Breeding 1998 (pairs)	Migration or wintering (individuals)			
			Highest numbers recorded in:	Minimum	Maximum	Estimated (migration)
Black-necked Grebe	M		Aug-Sept	31	2720	
Great Crested Grebe	M		Aug-Oct	6413	13665	
Great White Pelican	M		rarely	5534	5534	
Great Cormorant	B M	4185	Aug-Sept	4625	63515	
Great White Egret	M		Aug	1539	1539	
Little Egret	M		Aug	1572	7927	
Grey Heron	M		Aug-Sept	1245	2715	
Purple heron	M		Aug-Sept	283	2065	
Greater Scaup	M W		Jan	80000	80000	
Common Goldeneye	M W		Jan	1	5070	
Common Shelduck	M W		Aug	2393	14336	
Common Crane	M		Oct	56	4194	
Common Coot	B M W	4350	Aug-Nov	2500	247000	350000
Kentish Plover	B M		Aug	870	4218	
Avocet	B M	1917	Aug	2586	12297	
Wood Sandpiper	M		Aug, April	792	2875	
Common Redshank	B M	1418	Aug	2528	10702	
Marsh Sandpiper	M		Aug	1908	3082	
Little Stint	M		May, Aug-Sep	530	5148	26000
Curlew Sandpiper	M		May, Aug-Sep	4101	36870	120000
Dunlin	M		April-May, Aug-Sep	3295	34668	127000
Broad-billed Sandpiper	M		May, Aug	507	1958	
Mediterranean Gull	B M	12165	April-May, Aug-Sep	6492	19593	14000
Black-headed Gull	M		April, August	35372	35372	
Slender-billed Gull	B M	5382	April-May, Aug-Sep	4655	22839	
Yellow-legged Gull	M		Aug-Sept	1607	21397	
Black Tern	M		Aug	104	21492	
White-winged Black Tern	M		Aug	12687	36318	42000
Gull-billed Tern	M		Aug	1820	1820	
Caspian Tern	M		Aug	1115	1115	
Common Tern	B M	6371	Aug	1276	7928	
Sandwich Tern	B M	5103	Aug	5663	9534	
Little Tern	M		Aug	1946	3573	

Table 3.14: All available complete counts of higher risk species in the Eastern Sivash (migration and wintering periods) 1991-2005.

Species		Numbers by counting period and year													Statistics		
		April - 2003	April - 2005	August 1998	August 2004	October 2003	January 1991	January 1998	January 2000	January 2001	January 2002	January 2003	January 2004	January 2005	Average	Min	Max
Mute Swan	*Cygnus olor*		523	6606	559	1227	3500	3041	14510	1194	1429	205	3194	1260	**3104**	**205**	**14510**
Greater White-fronted Goose	*Anser albifrons albifrons*		3518				80000	40702	9366	52484	6879	14780	1784	5950	**23940**	**1784**	**80000**
Greylag Goose	*Anser anser*			3135	1214	53	800	2552	330	87	20			320	**946**	**20**	**3135**
Red-breasted Goose	*Branta ruficollis*						500	203	630	17070	2		30	10028	**4066**	**2**	**17070**
Eurasian Wigeon	*Anas penelope*	700	1095	106		4590	15		329	4663			850	6810	**2129**	**15**	**6810**
Common Teal	*Anas crecca*		679	1863	9702	35593				844					**9736**	**679**	**35593**
Mallard	*Anas platyrhynchos*		657	52649	30975	41805	40000	18404	34967	16522		1305	21102	5243	**23966**	**657**	**52649**
Northern Pintail	*Anas acuta*		525	162	26	16596			4	187			2096		**2799**	**4**	**16596**
Garganey	*Anas querquedula*	1527	9229	42893	25490										**19785**	**1527**	**42893**
Northern Shoveler	*Anas clypeata*	99	536	864	1583	39890				128					**7183**	**99**	**39890**
Red-crested Pochard	*Netta rufina*		800	1720	1104	2063			10000	53				3834	**2796**	**53**	**10000**
Common Pochard	*Aythya ferina*	3295	7684	15583	8506	78433	1000	508	200	291	26		2500		**10730**	**26**	**78433**
Tufted Duck	*Aythya fuligula*	14700	139189	472	106			220		11			23100		**25400**	**11**	**139189**
Northern Lapwing	*Vanellus vanellus*		332	1425	1073	59									**722**	**59**	**1425**
Black-tailed Godwit	*Limosa limosa*	250	1225	6584	592										**2163**	**250**	**6584**
Ruff	*Philomachus pugnax*	181770	22834	59324	77808	39									**68355**	**39**	**181770**
Black-headed Gull	*Larus ridibundus*		343	4557	35372	4527									**11200**	**343**	**35372**
Common Gull	*Larus canus*		210			1078	600	871	1679	661	1668	885	2221		**1097**	**210**	**2221**
TOTAL HIGHER RISK SPECIES		**202341**	**189379**	**197943**	**194110**	**225953**	**126415**	**66501**	**72015**	**94195**	**10024**	**17175**	**56877**	**33445**	**220117**		**764140**

Table 3.15: Occurrence of bird species identified as posing a special "contact risk with poultry": B = breeding, M = migrating, W = wintering

Species	Status			Breeding 1998	Migration or wintering				
					Period	Average	Min	Max	Upper estimate
Mute Swan	B	M	W	42	Aug-March	3278	205	14510	30000 (W)
Greater White-fronted Goose		M	W	0	Oct-Febr	20372	1784	80000	200000 (M)
Greylag Goose	B	M	W	30-50	Oct-Febr	1053	20	3135	22000 (M)
Eurasian Wigeon		M	W	0	Oct-March	1812	15	6810	65000 (M)
Common Teal		M		0	Aug-Nov March-Apr	11959	679	35593	
Mallard	B	M	W	438-633	Sept-Apr	24711	657	52649	65000 (W)
Northern Lapwing	B	M	W	303-369	Aug-Nov March-Apr	722	59	1425	
Ruff		M		0	March-May Aug-Oct	68355	39	181770	
Black-headed Gull		M		0	March-Apr Aug-Oct	11200	343	35372	
Ring-necked Pheasant	B		W	common	all year round				
Great Cormorant	B	M	W	4185	Aug-Sept		4625	63515	
Grey Heron	B	M			Aug-Sept		1245	2715	
Common Coot	B	M	W		Aug-Nov		2500	247000	350000 (M)
Feral Pigeon				common	all year round				
House Sparrow	B		W	common	all year round				
Eurasia Tree Sparrow	B	M	W	common	all year round				
Black-billed Magpie	B		W	common	all year round				
Jackdaw	B		W	common	all year round				
Carrion Crow	B	M	W	common	all year round				
European Starling	B	M	W	common	March-Apr, July-Oct	very numerous			500000 (M)

Occurrence of species of high conservation concern:

Species of International Conservation concern (IUCN, European Red List)
- Red-breasted Goose *Branta ruficollis* (W) - Up to 17,000 birds migrate/winter
- White-headed Duck *Oxyura leucocephala* (M) - Single birds on migration
- Ferruginous Duck *Aythya nyroca* (M) - Single birds on migration
- White-tailed Eagle *Haliaeetus albicilla* (W) - Tens wintering
- Pallid Harrier *Circus macrourus* (W) - Hundreds of wintering birds
- Lesser Kestrel *Falco naumanni* (B) - Tens breeding
- Black-winged Pratincole *Glareola nordmanni* (B) - Single pairs breeding
- Slender-billed Curlew *Numenius tenuirostris* (M) - Single birds on migration

Species of national conservation concern (Red Book of Ukraine)
- Squacco Heron *Ardeola ralloides* (M) - 179 on migration
- Great White Pelican *Pelecanus onocrotalus* (M) - Maximum 5,534 birds counted
- Eurasian Spoonbill *Platalea leucorodia* (B M) - 113 pairs breeding
- Glossy Ibis *Plegadis falcinellus* (B M) - 830 pairs breeding
- Common Goldeneye *Bucephala clangula* (W) - Up to 5,000 birds winter
- Long-legged Buzzard *Buteo rufinus* (M) - Single birds on migration
- Hen Harrier *Circus cyaneus* (W) - Hundreds of wintering birds
- Saker Falcon *Falco cherrug* (B) - Several pairs breed
- Collared Pratincole *Glareola pratincola* (B M) - 573 pairs breed
- Common Crane *Grus grus* (M) - About 10,000 stop over on migration
- Demoiselle Crane *Anthropoides virgo* (B M) - 10 pairs breeding
- Eurasian Oystercatcher *Haematopus ostralegus* (B M) - 143 pairs breeding
- Stone Curlew *Burhinus oedicnemus* (B) - 30 pairs breeding
- Black-winged Stilt *Himantopus himantopus* (B M) - 934 pairs breeding
- Kentish Plover *Charadrius alexandrinus* (B M) - 710 pairs breeding, 4218 on migration
- Eurasian Curlew *Numenius arquata* (M) - 690 birds on migration
- Whimbrel *Numenius phaeopus* (M) - 52 birds on migration
- Marsh Sandpiper *Tringa stagnatilis* (M) – 3,082 birds on migration
- Great Black-headed Gull *Larus ichthyaetus* (B M) - 2 pairs breeding
- Caspian Tern *Sterna caspia* (B M) - 360 pairs breeding

4. Places with high concentrations of vulnerable bird species

Breeding colonies

Most colonially breeding birds settle on the low-lying spits and islets in the northern part of the Eastern Sivash (Figure 3.8), which is richer in aquatic feeding resources than the southern part. Depending on the water level, colonies fluctuate in size and species composition, but the most important ones are located in the same places every year.

Table 3.14: Numbers of colonially breeding birds (in pairs) at the most important colonies in the Eastern Sivash in 1998. For codes of colonies see Figure 3.8

Species	Colony code								
	SE 21	SE 31	SE 32	SE 35	SE 50	SE 51	SE 53	SE 65	SE 81
Great Cormorant	1700					2485			
Avocet		100	86	10	25	807	20	15	
Common Redshank		157		30	10	268	11		
Yellow-legged Gull	307		109	850	70	551	300		
Mediterranean Gull		618		3000		8159	380		
Slender-billed Gull		16	3	250		2973	2100		
Gull-billed Tern	28		12			490	1420	30	
Caspian Tern	360								
Common Tern	280	850	128	1500		136	2600	100	400
Sandwich Tern		1400		2200					1500
Little Tern	142	18	34	18	2	300	60	10	80
Total	2817	3159	372	7858	107	16169	6891	155	1980

Concentrations of resting, foraging or roosting birds

The Eastern Sivash is a large area. It is therefore difficult to count all waterbirds in the area on a regular basis. Altogether 13 (near-)complete counts are available for the period 1991-2005, carried out in January (8), April (2), August (2) and October (1) (Table 3.14). These counts, together with other available data for the area, have been used for an analysis of the integrated density of waterbirds (breeding, migrating and wintering birds taken together) in the area in different seasons. Analysis used a spatial database and involved creating a raster model and performing analyses with GIS software. A summary of the results (integrated density all year round) is given in Figure 3.9. The figure shows that most waterbird concentrations occur along the coastline. High concentrations appeared to be related to food abundance and the absence of hunting. The analysis has been used for identifying high risk areas for the introduction and transmission of Avian Influenza as far as wild waterbirds are concerned (see below).

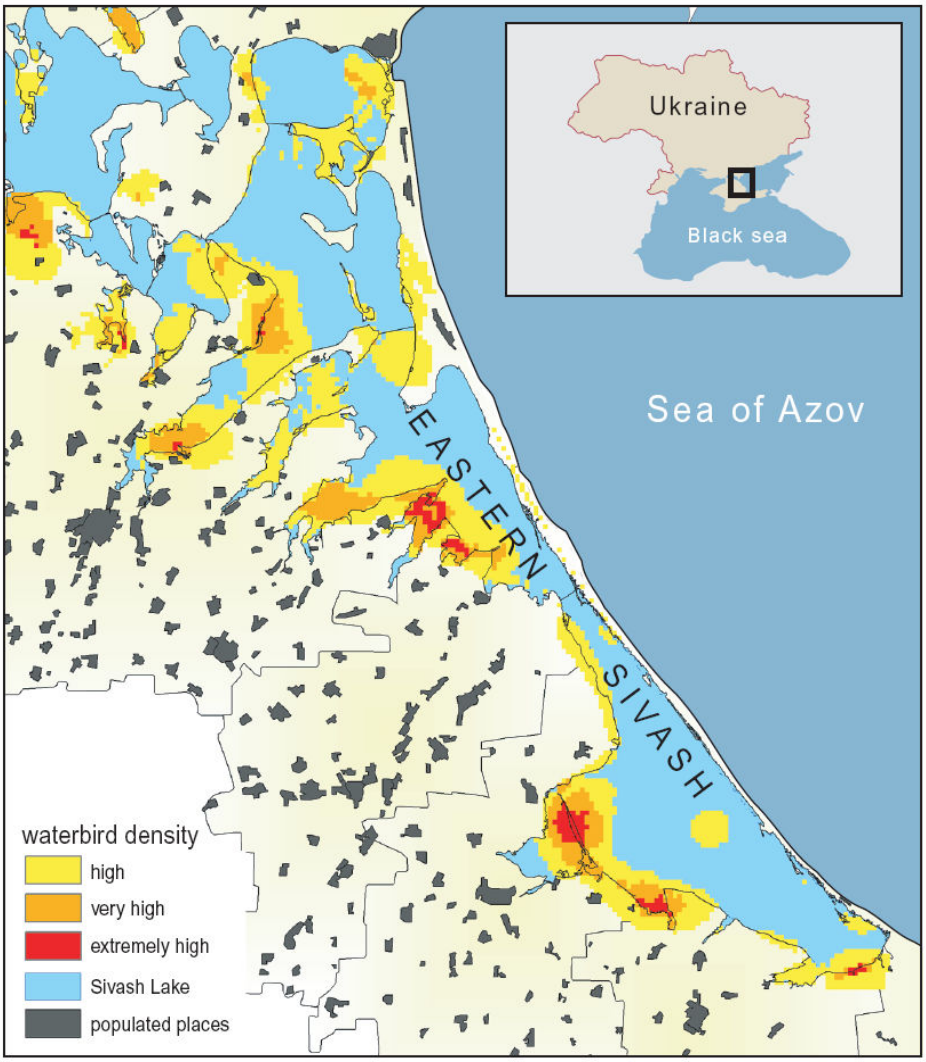


Figure 3.9: Density of waterbirds at the Eastern Sivash in all seasons

5. Local movements of vulnerable bird species

Geese (White-fronted and Red-breasted) and to a lesser extent Mallards staging or wintering in the area perform daily foraging flights to preferred grazing areas inland, some of which are as far as 10-15 km distant. Distribution of shorebird gatherings (especially Dunlin and Curlew Sandpiper) strongly depends on the water level at the foraging sites in lagoons. They quickly move from flooded to exposed mudflats, which are often situated at a distance of 10-15 km. Ruffs, which forage mostly on the fields adjacent to the wetland, intensively move between feeding areas and roosting/drinking sites on the coast. Gulls from breeding colonies or staging birds (Slender-billed Gull *Larus genei*, Mediterranean Gull *Larus melanocephalus*) make rather distant foraging flights to the fields and over shallows in various directions.

6. Position on flyways and consequences of bird movements further spread H5N1

General position in flyway

The Sivash is a rather important staging area for arctic and boreal breeding species, many of which use the Black Sea/Mediterranean Flyway both in spring and autumn. This flyway connects the northerly breeding grounds with winter quarters in the Mediterranean basin and Western Africa. For some species (White-fronted Goose, some ducks) the Eastern Sivash is not only a staging, but also a wintering area. Waterbirds passing the Eastern Sivash in spring head in E or ENE directions, many of them stopping over in the Caspian Sea region and the extensive wetlands in Northern Kazakhstan, SW and W Siberia before reaching their breeding grounds. During autumn migration, waterbirds arriving from these regions concentrate in the Eastern Sivash, some of them preparing for a long-distance flight in a southerly direction (as far as South Africa), others undergoing primary wing moult (ducks) or taking a rest before moving in SW-WSW direction to the Mediterranean basin or further into western Africa.

Ring recoveries

The EURING database has been searched for direct and indirect ring recoveries for the 17 species analysed in detail in Chapter 2, the results being given in Table 3.15. Maps are presented for Mute Swan, Greylag Goose and Mallard (see Figure 3.10).

Table 3.15: Number of direct and indirect recoveries for the Sivash for higher risk species analysed in detail in Chapter 2. (EURING data base).

English name	Latin name	Recoveries
Mute Swan	*Cygnus olor*	120
Greater White-fronted Goose	*Anser albifrons*	9
Greylag Goose	*Anser anser*	36
Red-breasted goose	*Branta ruficollis*	1
Eurasian Wigeon	*Anas penelope*	4
Gadwall	*Anas strepera*	3
Common Teal	*Anas crecca*	21
Mallard	*Anas platyrhynchos*	192
Northern Pintail	*Anas acuta*	18
Garganey	*Anas querquedula*	10
Northern Shoveler	*Anas clypeata*	1
Common Pochard	*Aythya ferina*	17
Black-headed Gull	*Larus ridibundus*	54
Black Tern	*Chlidonias niger*	2
	Total	**488**

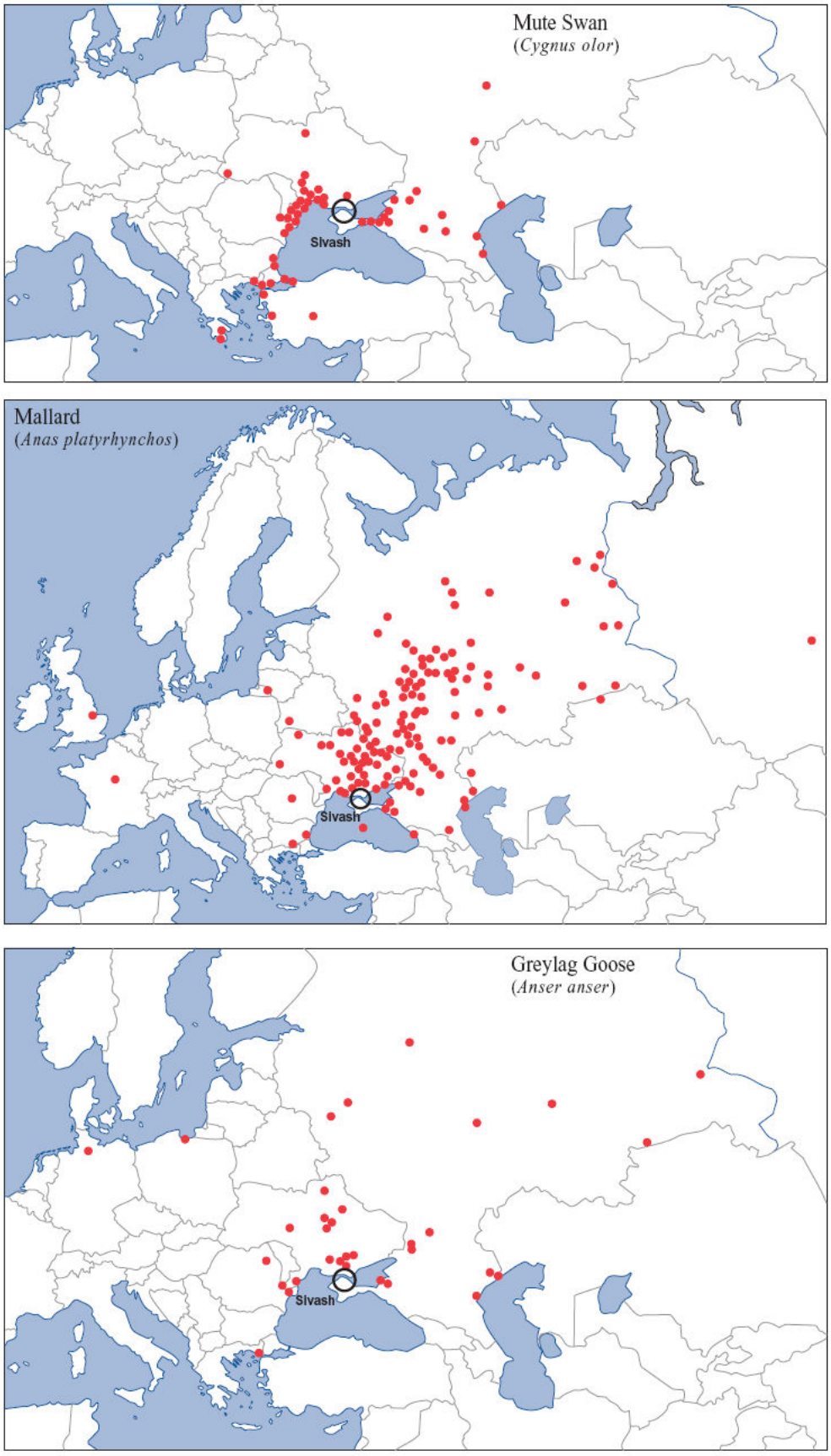


Figure 3.10: Direct and indirect ring recoveries for Mute Swan *Cygnus olor*, Mallard, *Anas platyrhynchos*, and Greylag Goose, *Anser anser* ringed or found in the Eastern Sivash (EURING database).

For most species the data available are few. Nevertheless a general pattern can be distinguished which largely confirms the position of the Sivash described above.

The ringing data show migratory connections with:

- wintering areas in Western and Southern Europe (Greater White-fronted Goose, Eurasian Wigeon, Northern Pintail, Garganey and Common Pochard)
- spring and autumn staging areas as well as presumed moulting areas along the Black and Caspian Seas (Greylag Goose, Northern Pintail, Northern Shoveler and Common Pochard)
- a large area situated NW-NE of the Sivash where most species of geese and ducks can be expected either to breed or to pass on the way to/from their breeding areas (most prominent in Greylag Goose and Mallard (see Figure 3.10).

Rather detailed information is available for Mute Swan *Cygnus olor*, which completes its life cycle around the Black, Caspian and Aegean Seas. Breeding probably takes place to a large extent in smaller inland wetlands, whereas staging and wintering is concentrated along the shores of the Black and Aegean Seas. Wintering locations are probably dependent on weather conditions, with cold weather movement taking place in a SW direction when conditions are severe. This probably was the case when the species unexpectedly appeared in the south of Greece and Italy, where it was involved in outbreaks of H5N1 in the winter of 2005-2006.

Consequences of bird movements for further spread of H5N1
There are well-known connections between the Caspian Sea and the Black Sea with waterbirds moving from the former to the latter in reaction to cold weather. Furthermore, there is an exchange of waterbirds between the Sivash and other wetlands in the Black Sea area. Also in this case, waterbirds tend to move westwards in reaction to cold weather. It is therefore believed that wetlands along the Black Sea coast are directly at risk in case of an outbreak in the Sivash. In fact the Eastern Sivash did already face a series of outbreaks of H5N1 in the winter of 2005-2006. These outbreaks, which occurred in October, November and January were all related in time with similar outbreaks in wetlands situated in the western part of the Black Sea (Turkey and Romania). Although there is no firm proof that waterbirds spread the disease in the area, there is a marked coincidence with their migratory movements.

Arctic shorebirds occurring in the Sivash (e.g. Dunlin and Curlew Sandpiper) might potentially spread H5N1 to other wetlands in the Mediterranean basin and into Africa. Ducks, Northern Pintail and Garganey in particular, might be involved in the spread the disease to wetlands in sub-Saharan West Africa.

Frequent changes of water level in the Eastern Sivash facilitate mixing of different species of waterbirds and their movements to the small freshwater ponds on the coast, where they can easily come into contact with domestic birds. In mild winters White-fronted and Red-breasted geese move daily between roosts and grazing areas, increasing the risk of spreading the disease inland in the radius of 10-15 km of the roosts. As everywhere else, gulls may play a linking role in the spread of disease carrying the virus from concentrations of waterbirds to various water bodies frequented by domestic birds, but their movements in search of food are hardly predictable. In August, when their numbers reach a maximum, many gulls and terns

forage over agricultural fields and come close to the settlements, roost on the ponds in the villages or nearby. In winter, during severe weather conditions, parts of the Eastern Sivash with low salinity may freeze up and then waterbird concentrations move to the hypersaline water areas in the southern part of Eastern Sivash and Central Sivash. In the extremely severe winter of 2006 the Sivash became totally frozen and all wintering waterbirds concentrated along the southernmost coast of the Crimean peninsula.

Occurrence of outbreaks of H5N1 in the winter of 2005-2006: predicting areas of special risk

A series of outbreaks of H5N1 occurred in the Eastern Sivash in the winter of 2005-2006. The first outbreak was recorded in October in the village of Nekrasovka which is located next to one of the most important waterbird concentration areas in the Sivash. Many of these waterbirds (especially Greater White-fronted Geese and Mallards) forage on the agricultural fields near the village where they mingle with domestic ducks. A second outbreak occurred in November, shortly after a cold spell had brought thousands of waterbirds to the area, among which were 15.000 Greater White-fronted Geese. A third outbreak took place in mid January. At that time the Volga delta had become totally frozen. This resulted in large numbers of waterbirds leaving the Caspian Sea area, visiting the Eastern Sivash, after which they were forced further westwards by freezing conditions.

It follows from the above that the onset of outbreaks could in all cases be related to the existence of waterbird concentrations or major migratory movements of these birds. After a "new outbreak" had started, there was usually a series of "satellite outbreaks" which were often away from the larger concentrations of wild waterbirds. An analysis of the chronology of the outbreaks, their distribution and the circumstances under which they took place led to the hypothesis that three major environmental factors might be involved: (1) the presence of wild waterbird concentrations; (2) the presence of irrigation canals and other small freshwater bodies near human settlements which might be a source of contact between wild and domestic birds, and (3) the density of the human population, as a reflection of the distribution of free roaming poultry.

Shortly after the second outbreak had taken place, an attempt was made to indicate areas with varying degree of "outbreak risk" on the basis of the above factors using spatial modelling as applied for the integrated bird density (see Figure 3.9). This time all three factors mentioned above were integrated. The analysis resulted in a map indicating areas of medium, high and very high risk which is indicated in Figure 3.11. The figure shows that most outbreaks were indeed located in the areas of highest and high risk. Two outbreaks which appeared after the analysis had been made (indicated as "predicted" in the figure) were also in or next to a high risk area. The analysis shows that spatial modelling might be a useful tool for indicating areas at risk for outbreaks of H5N1.

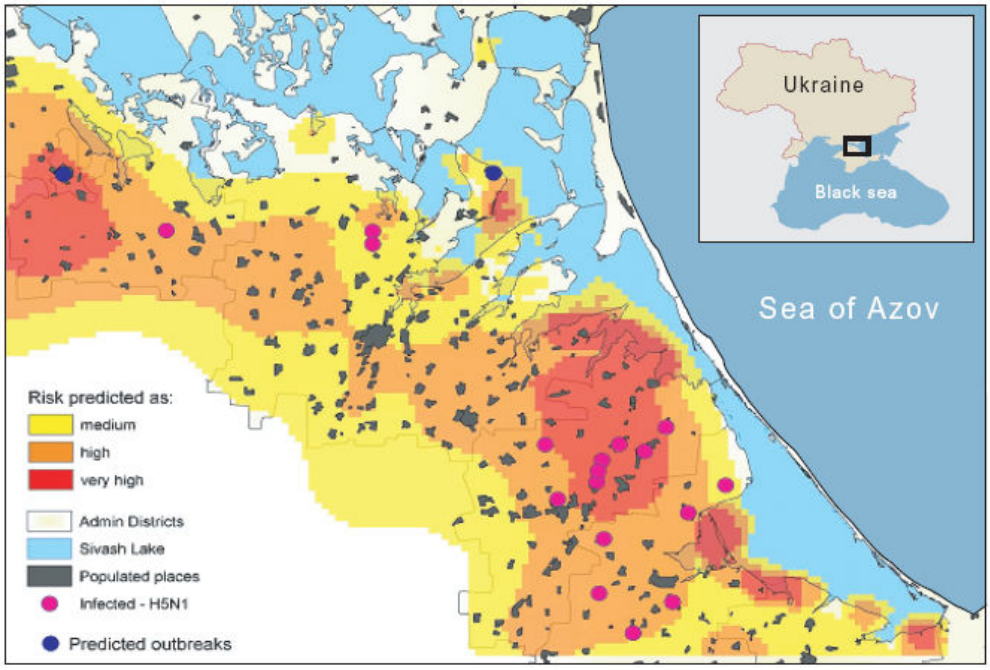


Figure 3.11 Estimated outbreak risk and actual outbreaks of H5N1 HPAI in the Eastern Sivash in early 2006

7. Human use of site and disturbance effects

Access to the public

The coast of Eastern Sivash has a low human population density. Most villages are concentrated along the North Crimean Canal and its branches, although some populated places are situated right on the coast close to places of seasonal concentrations of waterfowl. There is no public access limitation over most of the area, except for some hunting grounds during the season, and private fish-ponds. The Crimean coast of the Eastern Sivash is visited by a small number of local people who work on the adjacent fields, and also by hunters and fishermen. In the northern part of Arabatska Spit (south of Genichesk) there are some resorts, which are gradually recovering after the post-Soviet period and enjoy increasing numbers of visitors each year. Roads over most of the Eastern Sivash coast lack any paving and many areas are rather difficult to access.

Hunting regimes

Hunting (waterfowl, Pheasant, Quail, Grey Partridge, Brown Hare, Red Fox) is allowed in autumn (according to Ukrainian hunting law only on Tuesdays and at weekends). Waterfowl are hunted from mid-August till December; mammals - during winter. Hunting areas are divided among local hunters' associations and clubs. Access to the hunting grounds in leasehold of private hunting clubs is limited. Hunting pressure is medium, but poaching is rather widespread.

Other human usage of site

The local agriculture is primarily horticultural. Eighty per cent of the area is occupied by arable land; the remainder is occupied by orchards (2.2%), vineyards (1.2%) and fallow land (1.2%). Almost half of the cultivated land is under irrigation. Pastures

comprise more than 13% of the area. Mostly cattle and sheep are bred. Commercial fisheries have lost their importance over the last decade and only amateur fishermen catch fish in the Sivash and some small rivers that flow into it. Some bays of the Sivash have been turned into fishponds where carps are bred.

8. Existence of poultry farms within a radius of 10 km of site

Density, location and nature of poultry farms (chickens, ducks, turkeys)
An ostrich farm (300 birds) is located south of Strelkovoe village. Ostriches are kept in a fenced area under the open sky and are at risk of exposure to wild birds.

Villagers throughout the Eastern Sivash commonly keep chickens, ducks geese and turkeys. Official statistics were shown to underestimate the numbers of poultry in the private sector. During the epizooty of H5N1 in winter 2005-2006 a total of 29,135 birds were culled in 2,228 households in infected villages. This gives an average of around 13 birds per household, which is 5 times lower than figures reported by the veterinary service. Free roaming used to be a widespread practice throughout the region; poultry and other domestic animals are often kept together. Domestic geese and ducks also used to visit ponds, rivers, canals and artesian wells in the vicinities of villages. As the number of freshwater sources is limited, birds from different households often concentrated in these places, which were frequently visited by wild birds as well. Currently, the local veterinary service is making efforts to ensure that people keep poultry indoors and maintain basic rules of biosecurity.

Presence of other domesticated animals vulnerable for H5N1 (cats, pigs)
In the villages around Eastern Sivash cats and dogs are kept in nearly every household. Villagers also keep pigs, sheep, cows and horses. There are commercial herds of sheep and cows.

9. Measures to be considered in case of an outbreak

Monitoring bird mortality
In case of an outbreak of H5N1, monitoring for dead and moribund birds should take place at selected parts of the coast (Dzhankoi bay, sea side of Arabatska Spit) and several islands and spits (Tup-Tarkhan peninsula, Koyanly Islands, Cjongar Islands) with a focus on higher risk species. Staff of the Azov-Black Sea Ornithological Station should be involved. As the distances to walk along the muddy coast-line are rather large, bird mortality monitoring is feasible on a weekly basis only.

Sampling wild birds for the occurrence of AI
Staff of the Azov-Black Sea Ornithological Station in Melitopol have extensive experience of catching waders in this area. Mist-netting of shorebirds (Ruff, Curlew Sandpiper, Dunlin, Broad-billed Sandpiper, Little Stint) can be easily organised at the known suitable localities in April, May, August, September and October. Possibilities for catching ducks and other species have yet to be investigated. Fresh faeces from cormorants, gulls and terns can be collected in sufficient numbers at roosts and on the colonies. In winter, fresh droppings can be collected from White-fronted Goose at grazing sites.

Restrictions with respect to human activities in and near site
Restrictions should aim at minimizing the risk of further spread of H5N1, *inter alia* through avoiding disturbance of wild birds.

Measures to be considered are:

- ban on hunting and control of bird catching/ringing activities
- keeping cats and dogs indoors
- ban on collecting Nereis worms (local fishermen commonly collect *Neris diversicolor* on the mudflats, where waterbirds forage)
- restrictions with respect to the keeping and transport of poultry (conform with national/EU guidelines)
- restrictions with respect to the keeping of other vulnerable domesticated animals (conform with national/EU guidelines)
- informing the public (local press, on the road upon entering Crimea, information leaflets distributed in the villages).

10. Data sources

- [Distribution of waterbirds in the Sivash in summer-autumn period.]/ Andryushchenko Yu.A., Chernichko I.I., Chernichko R.N., Dyadicheva E.A., Garmash B.A., Gorlov P.I., Grinchenko A.B., Khomenko S.V., Kinda V.V., Kirikova T.A., Kostyushin V.A., Nilsen S.O., Nobel P. de, Popenko V.M., Roomen M. van, Siokhin V.D., Vinokurova S.V., Winden J.der.//Chernichko I.I. (ed.). Branta: Melitopol - Sonat: Simferopol, 1999. - 90 p. (in Russian)

- [Numbers and distribution of breeding water birds in the wetlands of Azov-Black Sea region of Ukraine]/ Siokhin V.D., Chernichko I.I., Andryushchenko Yu.A., Anosova I.V., Ardamatskaya T.V., Bagrikova N.A., Belashkov I.D., Beskaravainyi M.M., Garmash B.A., Dyadicheva E.A., Zhmud M.E., Zalevski V.D., Kinda V.V., Kirikova T.A., Kolomichuk V.P., Korzukov A.I., Kostin S.Yu., Kostyushin V.A., Koshelev A.I., Matsura A.V., Molodan G.N., Piluga V.I., Poluda A.M., Popenko V.M., Rudenko A.G., Rusev I.T., Stoilovski V.P., Tarina N.A. Chernichko R.N., Yaremchenko O.A.//Siokhin V.D. (ed.). – Branta: Melitopol-Kiev, 2000. – 476 p.

- International Waterbird Census Database. – Wetlands International, 1991-2004

- GIS on seasonal distribution of water birds in the Sivash area. – Wetlands International Black Sea Program, 2003-2006

3.3.4 Djoudj National Park, Senegal

1. General information

Name of site: Djoudj National Park
Country: Senegal
Coordinates: 16° 30'N and 16°10'W
Size: 16000 ha
Managing organisation: Direction des Parcs Nationaux du Sénégal
National Parks Department P.O. Box 5135, Dakar-Fann, tel. +221 832 2309

2. Short description of the site

Topography
Djoudj National Park is a large wetland in the Senegal River Delta (Figure 3.12). Some dunes with Tamarix vegetation lie in the North-east and in the south of the park. There is also a small dune system in the centre. There is no settlement inside the park but 7 villages are located in the buffer zone with a total population estimated at 3,800 individuals.

Djoudj national Park is one element of the complex of wetlands in the Senegal River delta (e.g. Diawling National Park, Mauritania, and Les Trios Marigots, Djeuss Marigot, Ndiaël Ramsar Site and Guembeul Reserve, Senegal). Djoudj is regularly flooded by fresh water coming mainly from the Senegal River through two dams, the Djoudj and Crocodile infrastructures.

Djoudj can be reached by car from Saint-Louis, regional Capital after 60km and from Ross Béthio at a distance of 15 km. Djoudj is a tourist destination and in some seasons, light aircraft can land at the small airport. Djoudj is open for tourism during 8 months from October to the end of May.

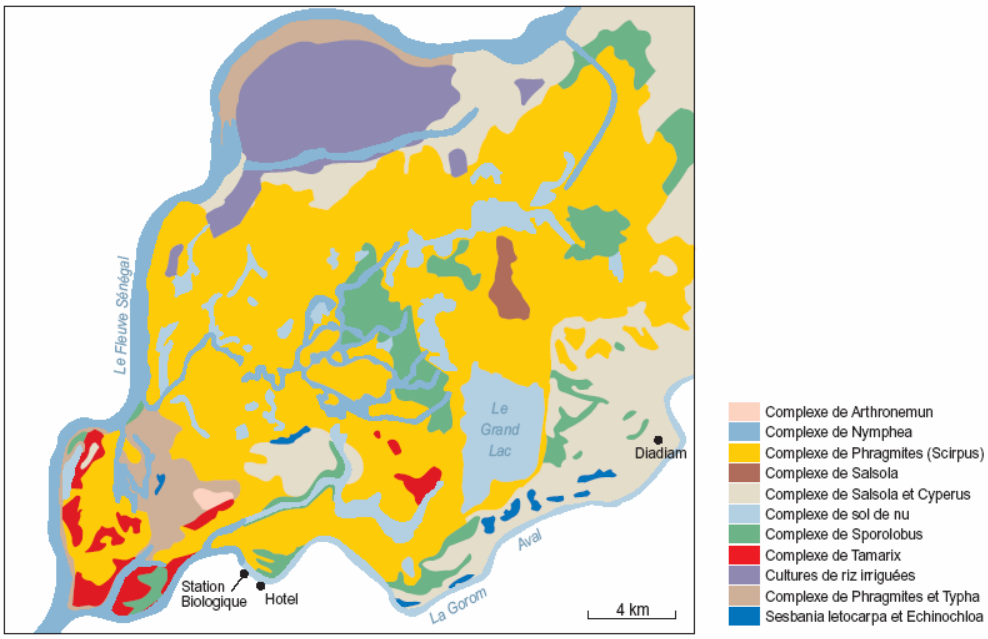


Figure 3.12: Topography and Vegetation types in the Djoudj national park

Habitat types
The main habitat types of the site are indicated on the vegetation map (Figure 3.12). About 80% of the total area is permanently flooded, providing excellent habitat for waterbirds for resting, foraging and nesting. The vegetation is mainly Typha on the western side, Phragmites in the centre and widely, Sporobolus sp. In the open water, there are two species of Water lilies, an important source of food for ducks and geese. The dunes are located in the south covered mainly by Tamarix vegetation.

Water depth, water temperature and water hydrology
The main river, called Djoudj, is 1.8 m deep between November and January. The water level decreases from February to June and the surrounding wetlands become completely dry.

The minimum temperature between January and August varies from 13° to 25°C, and the maximum from 30°C to 39°C between February and March.

The Flood gates of the Djoudj River and Crocodile River control the water level in the park with the aim of maintaining optimal breeding success and feeding conditions for waterbirds.

The water level determines the quality and the quantity of food available to waterbirds, and also determines the ecological character of the park

3. Occurrence of vulnerable bird species at the site

Numbers and seasonal presence of higher risk species
Table 3.16 shows the Higher Risk species identified in Chapter 1 that occur regularly at the Djoudj. The most numerous of these are (in order of abundance) Garganey, Ruff, Northern Pintail and Northern Shoveler. Two species in Table 3.16 are Globally Threatened according to IUCN Criteria: Marbled Teal, which is Vulnerable and Black-tailed Godwit which has recently been classified as Near-Threatened.

Table 3.16: Numbers and seasonal presence of higher risk species occurring regularly in Djoudj National Park. Numbers are based on January counts carried out in the period 1990-2006.

Species		Status	Occurrence	period	Mean number	Maximum number
Eurasian Wigeon	*Anas penelope*	M	Regular	Oct_March	73	420
Common Teal	*Anas crecca*	M	Regular	Oct_March	183	1418
Northern Pintail	*Anas acuta*	M	Regular	Oct_March	76256	119460
Garganey	*Anas querquedula*	M	regular	Oct_April	101638	221840
Northern Shoveler	*Anas clypeata*	M	Regular	Oct_April	10718	15665
Marbled Teal	*Marmaronetta angustirostris*	M	Irregular	Nov-March	2	2
Black-tailed Godwit	*Limosa limosa*	M	Regular	Oct_April	1653	2155
Ruff	*Philomachus pugnax*	M	Regular	Oct_May	62867	190000

Presence of other waterbird species which occur in large numbers:
Table 3.17 summarises the other waterbird species that occur in high numbers at the Djoudj. Most of these are resident or inter-African migrant species, but Eurasian Spoonbill, Greater Flamingo, the five wader species and both tern species migrate to and through Europe.

Table 3.17: Numbers and seasonal presence of other waterbirds species occurring in relatively in large number in Djoudj National Park. All species regularly occur in the area. Numbers are based on counts carried out in January in the period 1990-2006. M = migrant, B = breeding.

Species		**status**	**Mean number**	**Maximum number**
Little Grebe	*Tachybaptus ruficolis*	M	85	361
Great White Pelican	*Pelecanus onocrotalus*	B	9696	25190
Great Cormorant	*Phalacrocorax carbo*	B	2438	5936
Long-tailed Cormorant	*Phalacrocorax africanus*	B	795	2421
African Darter	*Anhinga rufa*	B	264	785
Grey Heron	*Ardea cinerea*	B	348	840
Great White Egret	*Egretta alba*	B	522	3413
Little Egret	*Egretta garzetta*	B	122	245
Black-crowned Night Heron	*Nycticorax nyctocorax*	B	3999	10052
Yellow-billed Stork	*Mycteria ibis*	M	197	456
Glossy Ibis	*Plegadis falcinellus*	M	278	633
Sacred Ibis	*Threskiornis aethiopicus*	M	124	293
Eurasian Spoonbill	*Platalea leucorodia*	M	622	1965
Greater Flamingo	*Phoenicopterus ruber roseus*	M	13150	28200
Lesser Flamingo	*Phoenicopterus minor*	M	3741	11655
White-faced Whistling Duck	*Dendrocygna viduata*	B	36223	120683
Fulvous Whistling Duck	*Dendrocygna bicolor*	B	2672	16093
Knob-billed Duck	*Sarkidiornis melanotos*	B	1560	8993
Spur-winged Goose	*Plectropterus gambensis*	B	863	1807
Egyptian Goose	*Alopochen aegyptiacus*	B	74	86
Black-Crowned Crane	*Balearica pavonina*	B	125	35
Black-winged Stilt	*Himantopus himantopus*	M	735	5501
Pied Avocet	*Recurvirostra avosetta*	M	819	5501
Little Stint	*Calidris minuta*	M	426	3655
Dunlin	*Calidris alpina*	M	16	172
Curlew Sandpiper	*Calidris ferruginea*	M	62	102
Caspan Tern	*Sterna caspia*	M	63	182
Black Tern	*Chlidonias niger*	M	08	29

Occurrence of bird species identified as posing a special "contact risk with poultry":
The following species which occur at the Djoudj have been identified as also frequently occurring in the neighbourhood of human habitation and free roaming poultry:

- Cattle Egret *Bubulcus ibis*
- Black Kite *Milvus migrans*
- Hooded Vulture *Necrosyrtes monachus*
- Senegal Coucal *Centropus senegalensis*
- Blue-naped Mousebird *Urocolius macrourus*
- Common Bulbul *Pycnonotus barbatus*
- Pied crow *Corvus albus*
- Grey-headed Sparrow *Passer griseus*
- Village Weaver *Ploceus cucullatus*
- Red-billed Firefinch *Lagonosticta senegala*

Occurrence of species of high Conservation concern:

- Black-crowned Crane *Balearica pavonina*: 150 breeding pairs
- Eurasian Spoonbill *Platalea leucorodia*: 600 non-breeding individuals (January count)
- African Pygmy Goose *Anas auritus*: 40 non-breeding individuals (January count)
- Marbled Teal *Marmaronetta angustirostris* Irregular non-breeding visitor in small numbers.

4. Places with high concentrations of vulnerable bird species

Breeding colonies

There are extensive colonies of Great White pelican, Wood Ibis, Knob-billed Goose, White-faced Tree Duck, Egyptian Goose, Spur-winged Goose, African Spoonbill, Sacred Ibis , Black-crowned Night Heron, Grey Heron, Little Egret, Great White Egret, Great Cormorant, Long-tailed Cormorant and African Darter (see also Figure 3.13).

Concentrations of resting, foraging or roosting birds

Northern Pintail, Garganey and Northern Shoveler may rest or forage in large groups at Grand Lac, Khar marsh and on Thieguel River and in its surroundings. During night time, they leave the park to visit Senegal River Marshes for feeding.

The White-faced Whistling Ducks aggregate in numbers up to 10,000 on the Djoudj river, at Grand Lac and at Khar river and lake (see Figure 3.13).

Ruffs and Black-tailed Godwits aggregate in large groups in Grand Lac and surroundings for resting and roosting.

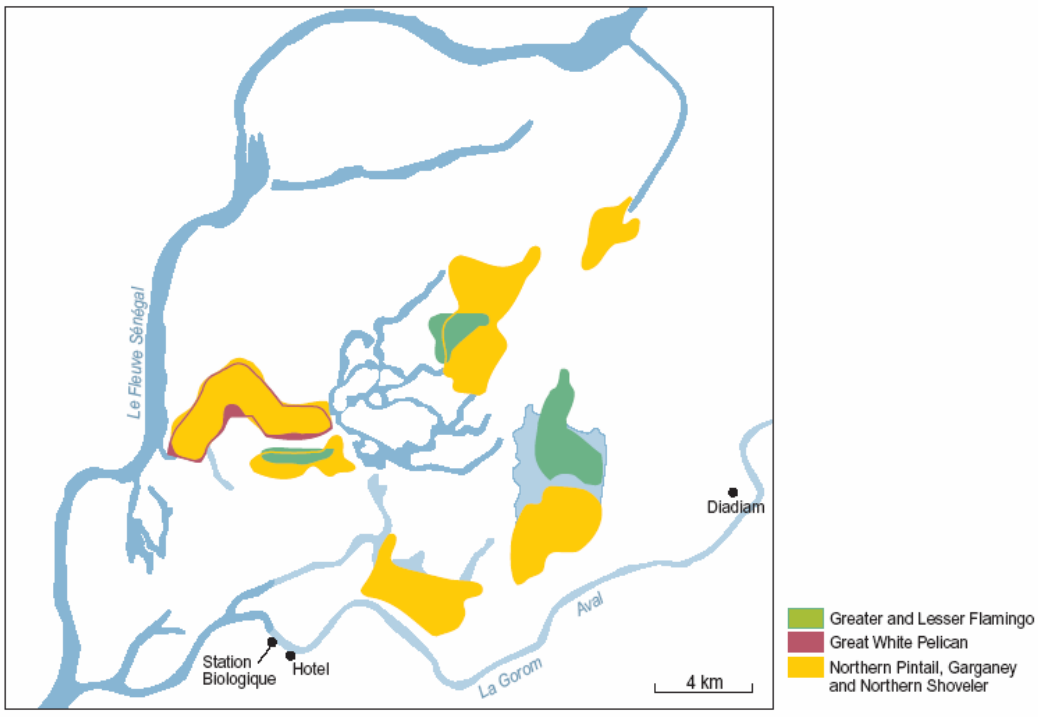


Figure 3.13: Areas of concentration for some waterbirds in the Djoudj

5. Local movements of vulnerable bird species

Pintails, Shovelers, Garganeys, Ruffs and Black-tailed Godwits often move locally between Djoudj marshes and surrounding wetlands. Ruffs and Black-tailed Godwits usually forage in the rice fields in the northern part of the park as well as elsewhere along the Senegal river. At a local scale, a number of wetlands in the lower Senegal delta are often used by the same bird populations for feeding and roosting. The distribution of these birds appears to be primarily determined by the presence of food, water (flooding) and safety (hunting, predators). See also under 6.

6. Position of site in flyway and consequences of bird movements for further spread H5N1

General position in flyway

The Djoudj National Park is situated in the East Atlantic Flyway in the Sub-Saharan zone. It connects breeding grounds of waterbirds situated in Greenland, Europe, Western and Central Asia with West African wintering grounds as far south as South Africa. Most northerly breeding waterbirds staging or wintering in the Djoudj make use of additional staging areas situated along the Atlantic coast of Europe and North Africa, or in the Mediterranean basin. Migratory waterbirds visiting the Djoudj usually follow the coastline, moving in N-S directions. However, there are also migratory movements in E-W directions, between the Djoudj and other West African flood plain systems, such as the Inner Niger Delta and Lake Chad. Some species like Garganey and Ruff may perform so-called loop migrations, flying southward through the western Mediterranean in autumn, and returning northward through the Central or Eastern Mediterranean in spring.

Ring recoveries

The EURING database has been searched for direct and indirect ring recoveries for the 17 species analysed in detail in Chapter 2, the results being given in Table 3.18. The data are sparse and only those for Garganey have been depicted (Figure 3.14).

Table 3.18: Number of direct and indirect recoveries for the Djoudj for higher risk species analysed in detail in Chapter 2. (EURING data base)

English name	Latin name	Recoveries
Northern Pintail	Anas acuta	4
Garganey	Anas querquedula	15
Northern Shoveler	Anas clypeata	3
Tufted Duck	Aythya fuligula	1
Black-headed Gull	Larus ridibundus	3
	Total	**26**

Figure 3.14: Direct and indirect ring recoveries for Garganey *Anas querquedula* ringed or found in the Djoudj (EURING database).

For the species mentioned recoveries are spread over Europe and Russia as far east as SW Siberia (Northern Pintail). There is one exception of a Garganey being recovered in the Inner Niger delta (Figure 3.14). These data are in line with the position of the Djoudj in the East Atlantic Flyway and the existence of a connection with West African flood plains.

Consequences of bird movements for further spread of H5N1
Waterbird movements connect the Djoudj National Park with several other wetlands in the West African region.

The following connections are highly relevant with respect to threat spreading H5N1:

- Shorebirds, Eurasian breeding ducks and African ducks aggregating in the Djoudj frequently use other wetlands in the lower Senegal Delta for feeding. There is also a regular exchange of birds between these wetlands depending on water level, food abundance and safety.

- Movements of Greater Flamingo, Northern Shoveler, Garganey and Northern Pintail have been shown to connect the Djoudj with Mauritania (Diawling and Banc d'Aguin), The Gambia, Guinea Bissau, Guinea and Mali.
- Outside the breeding season, Great White Pelicans breeding in the Djoudj often visit other Senegalese wetlands as well as wetlands in Mauritania (Banc d'Arguin National Park, Diawling National Park, Chott Boul Reserve).
- White-faced Whistling Ducks breeding in the Djoudj spread to other wetlands in the Senegal Delta, Mauritania and Mali after breeding.
- Knob-billed Ducks perform moult migration and may gather in the Djoudj in large numbers (maximum number 8993). After moult has been completed these ducks may be found foraging in rice fields along the Senegal river and the Niger river.
- It may be concluded from these data that any outbreak of H5N1 can potentially be spread by wild waterbirds within the West African region, especially in the lower Senegal Delta (Senegal-Mauritania).

7. Human use of site and disturbance effects.

Access to the public
Djoudj National Park is a popular and international destination for tourists with 15,000 visitors per year. The park is open From October to the end of May.

Hunting regimes
Hunting is mainly organised in the surrounding zone to the north-east and in the south. Shovelers, Pintails, Gargeneys and African ducks can be hunted. Shooting of these species is allowed in the morning and in the evening. These limitations restrict hunting pressure.

Other human usage of site
The local human populations have access to the park throughout the year to find lost domestic animals and to gather materials to make hats or carpets. In the buffer zone, the rice fields are the main livelihood of the local population. Fishing is forbidden in the park but from time to time poachers are arrested inside the park. Cattle grazing is not controlled.

8. Existence of poultry farms within a radius of 10 km of site

Density, location and nature of poultry farming
There are no commercial poultry farms within a radius of 10 km. The inhabitants of the Djoudj area keep small numbers of chickens and a few ducks which stay in the vicinity of human habitation.

Presence of other domesticated animals vulnerable to H5N1
There are few domestic cats or dogs in the eight villages surrounding the park, and pigs are not kept.

9. Measures to be considered in case of an outbreak

Monitoring bird mortality (when and where)

- In case of an outbreak of H5N1 monitoring for dead birds and moribund birds should take place at regular intervals (three times a week) and with a focus on higher risk species.
- Places to be inspected are:
- Preferred foraging/ resting areas of ducks (more attention for national committee for Avian Influenza: CONAGA).
- Preferred foraging/ resting areas of shorebirds and other birds foraging in the lower flooding areas.
- Monitoring activities should take place in such a way that disturbance of concentrations of birds is kept to a minimum.

Sampling wild birds for the occurrence AI

CONAGA in partnership with the ACTS (the Senegalese association of hunting and shooting) should ensure the catching of ducks, to sample Shovelers, Pintails, Garganeys, and Ruffs for AI virus analysis.
CONAGA is already involved in the AI sampling programme with CIRAD.

Restrictions with respect to human activities in and near the site

- Closing the park to the public (visitors and local inhabitants).
- Ban on hunting.
- Restrictions with respect to keeping and transport of poultry(conform national and international guidelines).
- Restrictions with respect to the keeping of other vulnerable domesticated animals (conform national and international guidelines).
- A surveillance system should also be established for neighbouring sites, such as the rice fields, the Trois Marigots, Diawling National Park and Djeuss area.

10. Data sources:

- Djoudj National Park Management Plan 2005
- Wetlands International IWC database 1990-2006.
- National committee for Avian Flu reports February and March 2006.
- Djoudj National Park staff,
- Wetlands International staff,
- Idrissa Ndiaye cp.

4. Future Work

The bulk of interpretation in this report is from two major databases, the International Waterbird Census (IWC) and the EURING database. In this preliminary assessment, we have provided an overview of the available data and have described the broad patterns in the abundance and movements of a selection of the higher risk species. In addition we have provided examples of the kind of information that can be rapidly brought together to describe the risk of an outbreak in a site spreading to other areas.

With such a broad analysis, it is inevitable that there will be gaps in our knowledge. These gaps can be filled in three ways: by more specific analysis of the existing data, by adding to or modifying the way the data are collected, or by developing novel techniques to determine with confidence how wild birds might spread the H5N1 throughout Europe.

- **The species dealt with in this report cover only a proportion of the species that are at risk of spreading H5N1.** To fill this gap it would be necessary to expand the current analysis to other species, including short-distance intra-European, Asian and African migrants and also to other taxonomic groups.

- **IWC counts have traditionally concentrated on wintering sites but large concentrations of birds can gather at different sites in spring and autumn.** Collecting more detailed information on stop-over sites used in autumn and spring, in particular the timing of occurrence and the numbers of higher risk species present at any one time. For example, do species X and Y overlap in time and space? This can be achieved by further analysing the IWC database and identifying gaps, which could be included in the IWC program in future.

- **Establish a system for mortality monitoring and assessing 'normal mortality'**. Baseline data need to be gathered to pick up exceptional mortality as different from 'normal mortality'. Little is known about this at present. Existing data gathering networks can be engaged in gathering this type of information.

- **At the current level of analysis only broad patterns in migration routes have been identified and not the precise routes or timing of migration.** We propose analysing the EURING data to understand better the direction and movements from individual regions within Europe. For example, the current analyses indicate a general direction of movement but contained within this is probably more than one migration route. We would develop smoothing techniques to identify the main directions of movement on a regional basis (e.g. one degree grid cells) and describe the phenology of migration. This could involve detailed analysis of ringing and count data for one, two or more Higher Risk species, in order to describe movements in space and time.

- **One of the major gaps in our knowledge is identifying which sites and species are the most likely to be involved in the spread H5N1 between flyways.** Identifying sites that bridge the gap between flyways can be done from ringing recoveries. For example in this report, it has been shown that different populations of several species mix in the eastern Sivash (Greater White-fronted Goose, Mallard, Eurasian Wigeon, Pintail, Teal, Garganey and Pochard) linking the East Atlantic flyway with the Black Sea/Mediterreanean flyway, whereas analysis of

the recovery data from Schiermonnikoog indicated that only one population of each species was involved.

- **Strategies for long-distance migration are poorly understood for many wildfowl species.** Migration strategy may also impact the ability of a wild bird to spread H5N1. Some species may migrate in short-hops whereas others migrate in long-distance jumps. We would aim to identify migration strategies for the high risk species and determine length of flights and stopover-times where possible from the literature. We would also specifically analyse EURING data to identify those species that undergo moult migrations and, in conjunction with IWC count data, determine the important moulting areas for particularly ducks, geese and swans, with the longer-term aim of developing the survey program to provide better count coverage of these sites at appropriate times.

- **Analysis of "contact risk with poultry" for "bridge species".** We know little about this for Europe and virtually nothing for Africa. This would involve survey work around poultry farms to identify the species that come into contact with poultry and determine the kind of behaviour that determines risk. Included within this would be survey work around outdoor pig farms as pigs can be a carrier as well.

- **In relation to trans-European migrants, we know very little about European-Afrotropical migration systems, which is important as it is a key potential source of H5N1 reaching Europe.** Knowledge is limited in part due to low ringing effort in Africa and also a low reporting rate of hunted birds. Initiation of a wildfowl ringing programe in key sites, e.g. Djoudj, where major passerine ringing activities have taken place before (but also sites in Mali, Nigeria & Chad and along the rift valley and coastal east Africa) would greatly improve our knowledge of movements of birds to and from these areas. The IWC data could be used to determine concentrations of waterbirds and sites, which may be suited for catching activities. In conjunction with the point above, collation of recovery data generated from within Africa (using data from the various African Ringing Schemes under the auspices of AFRING) would be necessary to describe movements of intra-African migrants.

- **Identify the degree to which individual species deviate from the general migration patterns identified in this report.** The major directions of movement have been identified for the species covered by this report. However it is important for tracking the potential spread of H5N1 to specifically look for species that show exceptions to these general movements, e.g. movement between flyways between years, exceptional movements, etc. To determine which species are more or less likely to show unusual movements, will require the development of statistical methods to objectively analyse the degree of abnormal movements using EURING data.

- **To determine the linkages between wintering, breeding and moulting areas may require other novel techniques to be used.** A method using stable isotopes in flight feathers has been used to successfully track shorebird migration in South and North America (Atkinson et al. 2005) and trace element analysis has been used in Sand Martins. Satellite tracking is now available for many waterbird species and could be a valuable tool to fill in gaps in our knowledge of bird movements.

References

Alexander, D.J., 2000. A review of avian influenza in different bird species. Vet. Microbiol., 74: 3-13.

Andreev V.A. 2003. Stopovers of Anseriformes during spring migration in North Dvina delta. In: Management and conservation of waterfowl populations in Northern Eurasia (with special focus on the White Sea-Baltic Flyway). Petrozavodsk, Russia. Pp. 6-8.

Andryushchenko Yu.A., Chernichko I.I., Chernichko R.N., Dyadicheva E.A., Garmash B.A., Gorlov P.I., Grinchenko A.B., Khomenko S.V., Kinda V.V., Kirikova T.A., Kostyushin V.A., Nilsen S.O., Nobel P. de, Popenko V.M., Roomen M. van, Siokhin V.D., Vinokurova S.V., Winden J.der.//Chernichko I.I. (ed.). Branta: Melitopol - Sonat: Simferopol, 1999. - 90 p. (in Russian)

Artyukhov A.I. 2003. Migration and status of geese in Bryansk region during last 25 years. Management and conservation of waterfowl populations in Northern Eurasia (with special focus on the White Sea-Baltic Flyway). Petrozavodsk, Russia. Pp. 8-9.

Avdanin V.O., P.M. Glazov, V.A. Grabovsky & M.G. Sinitsyn. 2005. Principal places of goose concentration during spring migration in Kostroma Region. In: Waterfowl of Northern Eurasia. Third International Symposium Abstracts. Saint-Petersburg. Pp. 7-8.

Bakken, V., Runde, O. & Tjørve, E. 2003. *Norsk Ringmerkings Atlas*. *Lommer - Alkefugler*. [Norwegian Bird Ringing Atlas]. Ringmerkingssentralen, Stavanger Museum.

Bauer, H.G., Bezzel, E. & Fiedler, W. (eds.) 2005. *Kompendium der Vögel Mitteleuropas.* Aula-Verlag, Wiebelsheim.

Bianki, V.V. & Dobrynina, I.N. 1997. *Anseriformes, Dabbling ducks.* In: Pavlov, D.S. (series ed.): *Migrations of Birds of eastern Europe and Northern Asia.* Nauka, Moscow.

BirdLife International (2004). Birds in Europe, population estimates, trends and conservation status. Cambridge, U.K: BirdLife International. (BirdLife Conservation Series No. 12).

Bønløkke, J., Madsen, J.J., Thorup, K., Pedersen, K.T., Bjerrum, M. & Rahbek, C. in press. *Dansk Trækfugleatlas. The Danish Bird Migration Atlas* (to be published spring 2006). Rhodos International Science & Art Publishers Ltd., Holtegaard, Humlebæk, Denmark.

Bragina, T.M. and E.A. Bragin (Eds). 2002. *The most important wetlands of North Kazakhstan (Kostanai Oblast and west part of North-Kazakhstan Oblast)*. Moscow: Russkiy Universitet Publishers. 156 pp. (In Russian).

Buzun V.A. 2005. Short review of waterbird migration and breeding in east part of Finland Bay and on Ladoga Lake. Waterfowl of Northern Eurasia. Pp. 50-53.

Cramp, S., (ed.) 1977. Handbook of the birds of Europe, the Middle East and North Africa. Volume I. Oxford University Press, Oxford, UK.

Cramp, S., (ed.) 1983. Handbook of the birds of Europe, the Middle East and North Africa. Volume III. Oxford University Press, Oxford, UK.

Cramp, S., (ed.) 1985. Handbook of the birds of Europe, the Middle East and North Africa. Volume IV. Oxford University Press, Oxford, UK.

Czech Duck Ringing project. URL:
http://www.mujweb.cz/veda/aythya/menu/records.htm

Deibel, R., D.E. Emord, W. Dukelow, V.S. Hinshaw & J.M. Wood, 1985. Influenza viruses and paramyxoviruses in ducks in the Atlantic Flyway, 1977-1983, including an H5N2 isolate related to the virulent chicken virus. Avian Diseases, 29/4: 970-985.

Delany, S.N., Martakis, G. & Scott, D.A.. in review 2005. Report on the Conservation Status of waterbirds in the Agreement Area, 2005. Information Document for the Third Meeting of the Parties to the African-- Eurasian Migratory Waterbird Agreement (AEWA), Dakar, Senegal, October 23-27 2005.
http://www.unep-aewa.org/meetings/en/mop/mop3_docs/mop3_info.htm

Djamirzoyev G., G. Magomedov, Yu. Pishvanov & L. Prilutskaya. 2004. *Birds of Dagestansky Nature Reserve.* Makhachkala. 95 pp. (In Russian)
Fokin, S., Kuzyakin, V., Kalchreuter, and Kirby, J.S. 2000. *The Garganey in the former USSR. A compilation of life-history information.* Wetlands International Publication.

Dodman, T. & Diagana, C.H. 2003. African Waterbird Census / Les Dénombrements d'Oiseaux d'Eau en Afrique. 1999, 2000 & 2001. Wetlands International Global Series No. 16. Wageningen, The Netherlands.

Ebbinge, B.S., G.J.D.M. Müskens, J.G. Oord, A.J. Beintema & N.W. van den Brink; Stuurbaarheid van ganzen door verjaging en flankerende jacht rondom het ganzenopvanggebied Oost-Dongeradeel (Friesland) in 1999-2000.; gepubliceerd: 05 okt 2000; 99 pp.

Fransson, T. & Pettersson, J. 2001. Svensk ringmärkningsatlas (Volym 1 Lommar-rovfåglar). [Swedish Bird Ringing Atlas (Volume 1 Divers-Raptors)]. Naturhistoriska riksmuseet & Sveriges Ornitologiska Forening, Stockholm. Including preliminary printouts for volume 2 (unpublished, 2006).
.
Frolov V.V., S.A. Korkina, D.V. Gomzin & A.V. Frolov. 2003. Nesting Anseriformes of the Penza Oblast. Casarca N 9. Moscow, pp. 344-361.

Gilissen, N., Haanstra, L. & Delany, S. Boere, G. & Hagemeijer, W. 2002. Numbers and Distribution of Wintering Waterbirds in the Western Palearctic and Southwest Asia in 1997, 1998 and 1999 - Results from the International Waterbird Census. Wetlands International Global Series No 11.

Gineev A.M., V.P. Belik & B.A. Kazakov. 2002. Russia. Directory of Azov-Black Sea Coastal Wetlands. Kyiv. Wetlands International. 229 p.

Gineev, Krivenko 1998 (Wetlands in Russia 1)

Gistsov A.P. 2004. Waterbird monitoring in North Caspian Sea in 2003. Kazakhstan Ornitological Newsletter. Almaty, Kazakhstan. Pp. 19-20.

Golovnyuk, V.V. 2005. Distribution and numbers of geese in mouth of Upper Taimyra River, Taymyr. Waterfowl of Northern Eurasia. Pp. 86-87.

Gordienko N.S. 2001. Current status of swans and geese in the Southern Zauralie (the Chelabinsk region). In: Problems of waterbird study and conservation in Eastern Europe and Northern Eurasia. Moscow, Russia.

Gurtovaya E., P. Tolvanen, T. Eskelin, I. Olsen, T. Bragina, T. Aravak, G. Eichhorn, A. Arkiomaa & S. Timonen. 1999. Preliminary results of the Lesser White-fronted Goose monitoring in Kazakhstan in October 1999. Casarca, N 5, Moscow, Russia. Pp. 145-154.

Hagemeijer, W.J.M. & Blair, M.J. (eds). (1997). The EBCC Atlas of European Breeding Birds: Their Distribution and Abundance. T. & A.D. Poyser, London.

Isenmann P. 2004/ Les Oiseaux de Camargue et leurs habitats. Une histoire de cinquante ans 1954-2004. Buchet-Chastel, Paris.

Kaleta, E.F., G. Hergarten & A. Yilmaz, 2005. Avian influenza A viruses in birds – an ecological, ornithological and virological view. Dtsch. Tierärztl. Wschr., 112/12: 441-480.

Kazakov, B.A., N.H. Lomadze, V.P. Belik et al. 2004. *Birds of the Northern Caucasia.* Volume 1: Gaviiformes, Podicepediformes, Procellariiformes, Ciconiiformes, Phoenicopteriformes, Anseriformes. Rostov-on-Don. 398 p. (In Russian).

Kear, J. (ed.) 2005. Ducks, Geese and Swans. Oxford University Press, Oxford. 908 pp. Two volumes.

Keller, V. (in press, 2006): Population size and trend of the Red-crested Pochard *Netta rufina* in southwest/central Europe: an update. in: Proceedings Conference Waterbirds around the World, Edinburgh 2004.

Kellomaki E., T. Khohlova, A. Lehtinen, N. Ripatti, P. Rusanen & P. Uronen. 2003. Stop-over sites of migrating geese in Kargopol district, Arkhangelsk region, NW-Russia. In: Management and conservation of waterfowl populations in Northern

Eurasia (with special focus on the White Sea-Baltic Flyway). Petrozavodsk, Russia. Pp. 194-195.

Kondratyev A.V. & V.A. Buzun. 2003. Autumn migration of geese and other waterfowl on Il'men' Lake in 2002. In: Management and conservation of waterfowl populations in Northern Eurasia (with special focus on the White Sea-Baltic Flyway). Petrozavodsk, Russia. Pp. 77-78.

Krivenko V.G. & V.G. Vinogradov. 2001. Current status of waterfowl resources in Russia and issues of its conservation. On: http://www.biodat.ru/chm/vbu/index.htm.

Krivenko V.G. (Ed.). 1999. Wetlands in Russia. Volume 1: Wetlands of International Importance. Wetlands International - AEME Publ. 52, 194 pp.

Krivenko V.G. (Ed.). 2000. Wetlands in Russia. Volume 3: Wetlands on the Ramsar Shadow List. Wetlands International Global Series No 6, 409 pp.

Kuchin A.P. 1998. Distribution and breeding of the Greylag Goose in the Altay Steppe and forest plains. In: Casarca, N 4. Pp. 143-149.

Kuznetsov, E.A., N.V. Anzigitova. 2002. Nesting numbers and summer distribution of the Mute Swan in the former USSR: A Review. In: Casarca, N 8. Pp. 199-232.

Kuznetsov, Anzigitova 2002, Krivenko, Moshonkin, Kamennova, 1998 (Wetlands in Russia, 1).

Madsen, J., Cracknell, G. & Fox, A.D. (eds.) 1999. Goose populations of the Western Palearctic: a review of status and distribution. Wetlands International Publication No. 48/NERI, Denmark. 343 pp.

Mishchenko A.L., O.V. Sukhanova, S.P. Kharitonov, V.A. Zubakin & S.V. Volkov. 2002. Current status of rare, vulnerable and game birds in the Vinogradovo floodplains, Moscow Region. In: Inventory, monitoring and conservation of Important Bird Areas of Russia. Issue 4. Moscow, Russia. Pp. 87-107.

Moskvitin S.S., I.G. Korobitsyn, O.Yu. Tyutenkov & A.S. Panin. 2004. Wader migration in the taiga zone of south-eastern West Siberia. In: Waders of the Eastern Europe and Northern Asia: Studies and Conservation. Pp. 151-157.

Nikolayev V.I. 1998. Birds of swamp landscapes of the National Park "Zavidovo" and Upper Volga. Tver'. Russia. 215 p.

Olsen, B., Munster, V.J., Wallensten, A., Waldenström, J., Osterhaus, A.D.M.E., & Fouchier R.A.M. 2006. Global Patterns of Influenza A Virus in Wild Birds. Science 312: 384-388.

Pavlov, D.S. (ed.) 1985. Migrations of birds of Eastern Europe and northern Asia. Gruiformes - Charadriiformes. Nauka, Moscow, Russia.

Pavlov, D.S. (ed.) 1989. Migrations of birds of Eastern Europe and northern Asia. Anseriformes. Nauka, Moscow, Russia.

Pavlov, D.S. (ed.) 1979. Migrations of birds of Eastern Europe and northern Asia. Anseriformes (Dabbling ducks). Nauka, Moscow, Russia.

Pavlov, D.S. (ed.) 1979. Migrations of birds of Eastern Europe and northern Asia. Ciconiiformes – Anseriformes. Nauka, Moscow, Russia.

Recovery maps from the Italian Bird Ringing Scheme.

Rocamora, G. 1994. Les Zones Importantes pour le Conservation des Oiseaux en France. Ministère de l'Environnement, BirdLife International, LPO.

Roggeman, W., Huisseune, D., Vangeluwe, D., Vandenbulch, P. & Vandousselare, P. 1995. Belgium Ringing Scheme Databank: Gavidae to Anatidae. Studiedocumenten van het Koninklijk Belgisch Instituut voor Naturwetenschappen, Brussels, Belgium.

Rusanov G.M., N.N. Gavrilov, A.K. Gorbunov et al. 2003. Structural changes in ecosystems of Astrakhan biosphere reserve caused by raising of the Caspian Sea level. Astrakhan. (In Russian).

Sazonov S.V. 2003. Spring stop-over sites of geese on Shuya farmlands in vicinity of Petrozavodsk. In: Management and conservation of waterfowl populations in Northern Eurasia (with special focus on the White Sea-Baltic Flyway). Petrozavodsk, Russia. Pp. 134-135.

Scott, D. A. & Rose, P. M. (1996). Atlas of Anatidae Populations in Africa and Western Eurasia. Wetlands International Publication No. 41. Wetlands International. Wageningen, The Netherlands.

Siokhin V.D., Chernichko I.I., Andryushchenko Yu.A., Anosova I.V., Ardamatskaya T.V., Bagrikova N.A., Belashkov I.D., Beskaravainyi M.M., Garmash B.A., Dyadicheva E.A., Zhmud M.E., Zalevski V.D., Kinda V.V., Kirikova T.A., Kolomichuk V.P., Korzukov A.I., Kostin S.Yu., Kostyushin V.A., Koshelev A.I., Matsura A.V., Molodan G.N., Piluga V.I., Poluda A.M., Popenko V.M., Rudenko A.G., Rusev I.T., Stoilovski V.P., Tarina N.A. Chernichko R.N., Yaremchenko O.A.//Siokhin V.D. (ed.). – Branta: Melitopol-Kiev, 2000. – 476 p.

Snow, D.W. & Perrins, C.M. 1998. The Birds of the Western Palearctic. Volume 1: Non-Passerines. Concise Edition. Oxford University Press, Oxford, UK & New York, USA. 1,008 pp.

Soloviev S.A. 2000. Potential IBAs of Omsk region. Inventory, monitoring and conservation of Important Bird Areas of Russia. Moscow, Russia. Pp. 133-135.

SOVON Vogelonderzoek Nederland 2002. Atlas van de Nederlandse Broedvogels 1998-2000. Nederlandse Fauna 5. Nationaal Natuurhistorisch Museum Naturalis, KNNV Uitgeverij & european Invertebrate Survey, Leiden, The Netherlands.

Speek, B.J. & Speek, G. (1984). *Thieme's vogeltrekatlas*. Thieme, Zutphen.

Stroud, D.A., Davidson, N.C., West, R., Scott, D.A., Haanstra, L., Thorup, O., Ganter, B. & Delany, S. (compilers) on behalf of the International Wader Study Group. 2004. Status of migratory wader populations in Africa and Western Eurasia in the 1990s. International Wader Studies 15: 1-259.

Stuurgroep Avifauna Schiermonnikoog 2005 (redactie). Vogels van Schiermonnikoog. Uniepers, Abcoude.

Sultanov E. (Ed.). 2000. *Potential Ramsar Sites of Azerbaijan*. Baku, Wetlands International-AEME Publ. 152 p. (in Azeri and Russian languages).

Svazas S., A. Kozulin, G. Grishanov et al. 2003. Important Transboundary Belarussian-Lithuanian and Lithuanian-Russian Wetlands. Institute of Ecology of Vilnius University & "OMPO Vilnius" Publishers. Vilnius. 96 pp.

Sviridova T.V. & V.A. Zubakin. 2004. The influences of agricultural methods to the breeding waders (Moscow region). In: Waders of the Eastern Europe and Northern Asia: Studies and Conservation. Pp. 173-180.

Tamisier, A. & Dehorter, O. 1999. Camargue Canards et Foulques: fonctionnement et devenir d'un prestigieux quartier d'hiver. C.O.Gard, Nimes.

United States geological Survey, 2006. Overview of H5N1 infected bird species (regular updates with references). http://www.nwhc.usgs.gov/disease_information/avian_influenza/affected_species_chart.jsp

Unpublished printout of recovery maps from the Helsinki Bird Ringing Scheme.

Veen J., Yurlov, A.K., Delany S.N., Mihantiev, A.I., Selivanova, M.A. & Boere, G.C. 2005. *An atlas of movements of Southwest Siberian waterbirds.* Wetlands International, Wageningen, The Netherlands.

Vinokurov, A.A. 2001. Red-breasted Goose. In: Red Data Book of Russian Federation. Moscow. Pp. 397-399.

Webster, R.G., W.J. Bean, O.T. Gorman, T.M. Chambers & Y. Kawaoka, 1992. Evolution and ecology of Influenza A viruses. Microbiological reviews 56: 152-179.

Wernham, C.V., Toms, M.P., Marchant, J.H., Clark, J.A., Siriwardena, G.M. & Baillie, S.R. 2002. The Migration Atlas: Movements of the Birds of Britain and Ireland. T. & A.D. Poyser, London, UK. 884 pp.

Wetlands International. In press, 2005. Waterbird Population Estimates - Fourth Edition. Wetlands International Global Series Xx, Wageningen, The Netherlands.

Wetlands International., 2002. Waterbird Population Estimates – Third Edition. Wetlands International Global Series 12, Wageningen, The Netherlands.

Yakushev N.N & E.V. Zavialov. 2005. Dynamics of distribution and status of swans in north part of Lower Volga Valley. Waterfowl of Northern Eurasia. Pp. 292-293.

Yerokhov S.N. & N.N. Berezovikov. 2004. Ornithological observations in Kustanay region in autumn 2003. Kazakhstan Ornitological Newsletter. Almaty, Kazakhstan. Pp. 46-49.

Yerokhov S.N. 2003. Greylag Goose in Kazakhstan: distribution, numbers, and the main stages of the annual cycle. Casarca N 9. Moscow. Pp. 103-135.

Zimin V.B., N.V. Lapshin & A.V. Artemiev. 2001. Species composition and numbers of geese at the Olonets spring stopovers. In: Problems of waterbird study and conservation in Eastern Europe and Northern Eurasia. Moscow, Russia. Pp. 49-51.

ANNEXES

Annex 1.1
Evaluation of species considered to pose a high risk of carrying Asian H5N1 lineage

Evaluation of migratory waterbird species which pose a relatively high risk of spreading Asian lineage H5N1 to and within the European Union. Only species belonging to the orders of the Anseriformes and Charadriiformes, which migrate from outside the EU to within EU borders are included. Codes used for bahaviour/ecology are explained in Section 1.3. Codes used for migration behaviour are Y (yes) and N (no). Codes used for contact risk with poultry are 0 (no risk), L (low risk), M (medium risk) and H (high risk). Higher risk species are indicated with green shading. Criteria for not selecting the other species are indicated with yellow shading.

English name	Scientific name	Behaviour/ecology*			Migration behaviour**			***
		Main habitat during migration/wintering	Gregariousness during migration/winter	Degree of mixing during migration/winter	Does species have a well-defined flyway?	Potential direct migratory linkage Black or Aegean Seas to EU?	Potential direct migratory linkage Southern Urals to EU?	Consolidated risk of contact with poultry
Whooper Swan	*Cygnus cygnus*	FA	SL	M	Y	Y	?	0
Bewick's Swan	*Cygnus columbianus*	FA	ML	M	Y	N	N	0
Mute Swan	*Cygnus olor*	FA	ML	M	N	Y	?	M
Pink-footed Goose	*Anser brachyrhnchus*	FA	LH	M	Y	N	N	0
Bean Goose	*Anser fabalis*	FA	LM	H	Y	N	N	L
Greater White-fronted Goose	*Anser albifrons albifrons*	FA	LH	H	N	Y	Y	L
Greenland White-fronted Goose	*Anser albifrons flavirostris*	FA	MH	L	Y	N	N	0
Lesser White-fronted Goose	*Anser erythropus*	FA	LH	M	Y	N	N	0
Greylag Goose	*Anser anser*	FA	LH	H	Y	Y	N	M
Barnacle Goose	*Branta leucopsis*	FAL	LH	H	Y	N	N	0
Brent Goose	*Branta bernicla*	FAL	LH	M	Y	N	N	0
Red-breasted Goose	*Branta ruficollis*	AL	MH	H	Y	Y	Y	0
White-headed Duck	*Oxyura leucocephala*	F	SM	M	N	Y	Y	0
Ruddy Shelduck	*Tadorna ferruginea*	F	SM	?	N	Y	Y	0
Common Shelduck	*Tadorna tadorna*	LFA	ML	L	N	Y	N	0
Eurasian Wigeon	*Anas penelope*	FAL	LH	H	N	Y	Y	H
Gadwall	*Anas strepera*	F	SM	H	N	Y	?	L
Common Teal	*Anas crecca*	FAL	MH	H	N	Y	Y?	L
Mallard	*Anas platyrhynchos*	FAL	MH	H	N	Y	N	H
Northern Pintail	*Anas acuta*	FAL	MH	H	N	Y	Y?	L
Garganey	*Anas querquedula*	F	MM	H	N	N	Y	L
Northern Shoveler	*Anas clypeata*	FL	MH	H	N	Y?	Y	L
Marbled Teal	*Marmaronetta angustirostris*	F	MM	H	N	N	N	0
Red-crested Pochard	*Netta rufina*	F	MM	?	N	Y	N	L
Common Pochard	*Aythya ferina*	F	MH	H	N	Y	Y	L
Ferruginous Duck	*Aythya nyroca*	F	OM	?	N	Y	N	0
Tufted Duck	*Aythya fuligula*	F	MH	H	N	Y	Y	L
Greater Scaup	*Aythya marila*	MF	LH	H	Y	N	N	0
Common Eider	*Somateria mollissima*	M	LH		Y	N	N	0
King Eider	*Somateria spectabilis*	M	SH	L	N	N	N	0
Steller's Eider	*Polysticta stelleri*	M	SH	L	Y	N	N	0
Long-tailed Duck	*Clangula hyemalis*	M	MM	L	Y	N	N	0

Common Scoter	*Melanitta nigra*	M	LH	M	Y	N	N	0
Velvet Scoter	*Melanitta fusca*	M	SM	H	Y	N	N	0
Common Goldeneye	*Bucephala clangula*	FM	SM	M	N	N	N	0
Smew	*Mergellus albellus*	F	MH	L	Y	N?	N	0
Red-breasted Merganser	*Mergus serrator*	M	MM	M	Y	N	N	0
Goosander	*Mergus merganser*	FM	MM	L	N	N	N	0
Eurasian Oystercatcher	*Haematopus ostralegus*	LFA	LH	H	N	N?	N	0
Black-winged Stilt	*Himantopus himantopus*	FLN	SL	M	Y	Y	N	0
Avocet	*Recurvirostra avosetta*	LFN	SM	M	Y	Y	N	0
Stone-Curlew	*Burhinus oedicnemus*	AN	OO	L				0
Collared Pratincole	*Glareola pratincola*	AN	SL	?		N?	N?	0
Northern Lapwing	*Vanellus vanellus*	FA	MH	M	N	Y?	Y	M
Sociable Lapwing	*Vanellus gregarius*	AN	?	L	N	N	N	0
Eurasian Golden Plover	*Pluvialis apricaria*	AN	LH	M	Y	N	N	L
Grey Plover	*Pluvialis squatarola*	L	MH	H	Y	N	N	0
Little Ringed Plover	*Charadrius dubius*	FN	OL	L	?	Y?	?	0
Great Ringed Plover	*Charadrius hiaticula*	LA	SM	H	Y	N	N	0
Kentish Plover	*Charadrius alexandrinus*	L	SM	M	Y	Y	N	0
Caspian Plover	*Charadrius asiaticus*	FAN	SM	L	N	N	N	0
Eurasian Dotterel	*Charadrius morinellus*	AN	OL	L	N	N	N	0
Eurasian Woodcock	*Scolopax rusticola*	O	OL	L	N	N	Y?	0
Jack Snipe	*Lymnocryptes minimus*	FN	OL	L	N	?	?	0
Great Snipe	*Gallinago media*	FAN	OL	L	N	N	N	0
Common Snipe	*Gallinago gallinago*	FA	SL	L	N	Y	Y	L
Black-tailed Godwit	*Limosa limosa*	FAL	MM	H	Y	N	N	0
Bar-tailed Godwit	*Limosa lapponica*	L	LH	H	Y	N	N	0
Whimbrel	*Numenius phaeopus*	FAL	SL	M	Y	N	N	0
Slender-billed Curlew	*Numenius tenuirostris*	FN	OL	L	N	N	N	0
Eurasian Curlew	*Numenius arquata*	LFA	MM	H	N	N	N	L
Spotted Redshank	*Tringa erythropus*	FL	SL	M	N	N	N	0
Common Redshank	*Tringa totanus*	LFA	MM	H	Y	Y?	N	0
Marsh Sandpiper	*Tringa stagnatilis*	FN	SL	M	N	N	N	0
Common Greenshank	*Tringa nebularia*	LF	SL	M	N	N	N	0
Green Sandpiper	*Tringa ochropus*	FN	OL	L	N	Y?	N	0
Wood Sandpiper	*Tringa glareola*	FN	OL	L	N	N	N	0
Terek Sandpiper	*Tringa (Xenus) cinerea*	FL	OL	M	N	N	N	0
Common Sandpiper	*Tringa (Actitis) hypoleucos*	FL	OL	O	N	N	N	0
Ruddy Turnstone	*Arenaria interpres*	L	SM	H	Y	N	N	0
Red Knot	*Calidris canutus*	L	LH	H	Y	N	N	0
Sanderling	*Calidris alba*	L	MH	M	N	N	N	0
Little Stint	*Calidris minuta*	FN	SL	M	N	N	N	0
Temminck's Stint	*Calidris temminckii*	FN	SL	M	N	N	N	0
Purple Sandpiper	*Calidris maritima*	L	SM	M	N	N	N	0
Dunlin	*Calidris alpina*	L	LH	H	Y	N	N	0
Curlew Sandpiper	*Calidris ferruginea*	L	MM	H	N	N	N	0
Broad-billed Sandpiper	*Limicola falcinellus*	FL	SL	L	Y	N	N	0
Ruff	*Philomachus pugnax*	FA	MM	M	Y	N	N	L
Red-necked Phalarope	*Phalaropus lobatus*	M	SL	L	N	N	N	0
Grey Phalarope	*Phalaropus fulicaria*	M	ML	L	N	N	N	0
Great Skua	*Stercorarius skua*	M	OO	L	N	N	N	0
Pomarine Skua	*Stercorarius pomarinus*	M	OO	L	N	N	N	0
Arctic Skua	*Stercorarius parasiticus*	M	OO	L	N	N	N	0
Long-tailed Skua	*Stercorarius longicaudus*	M	OO	L	N	N	N	0
Mediterranean Gull	*Larus melanocephalus*	MA	SM	H	N	Y	N	0
Little Gull	*Larus minutus*	MF	SL	M	N	Y	Y	0
Black-headed Gull	*Larus ridibundus*	FAL	LM	H	N	Y?	N	H
Audouin's Gull	*Larus audouinii*	ML	SL	L	N	Y	N	0
Common Gull	*Larus canus*	FAL	MM	H	N	N	N	H
Lesser Black-backed Gull	*Larus fuscus*	MA	MM	H	N	N	N	L
Herring Gull	*Larus argentatus*	LA	MM	H	N	N	N	L
Iceland Gull	*Larus glaucoides*	ML	SL	M	N	N	N	0

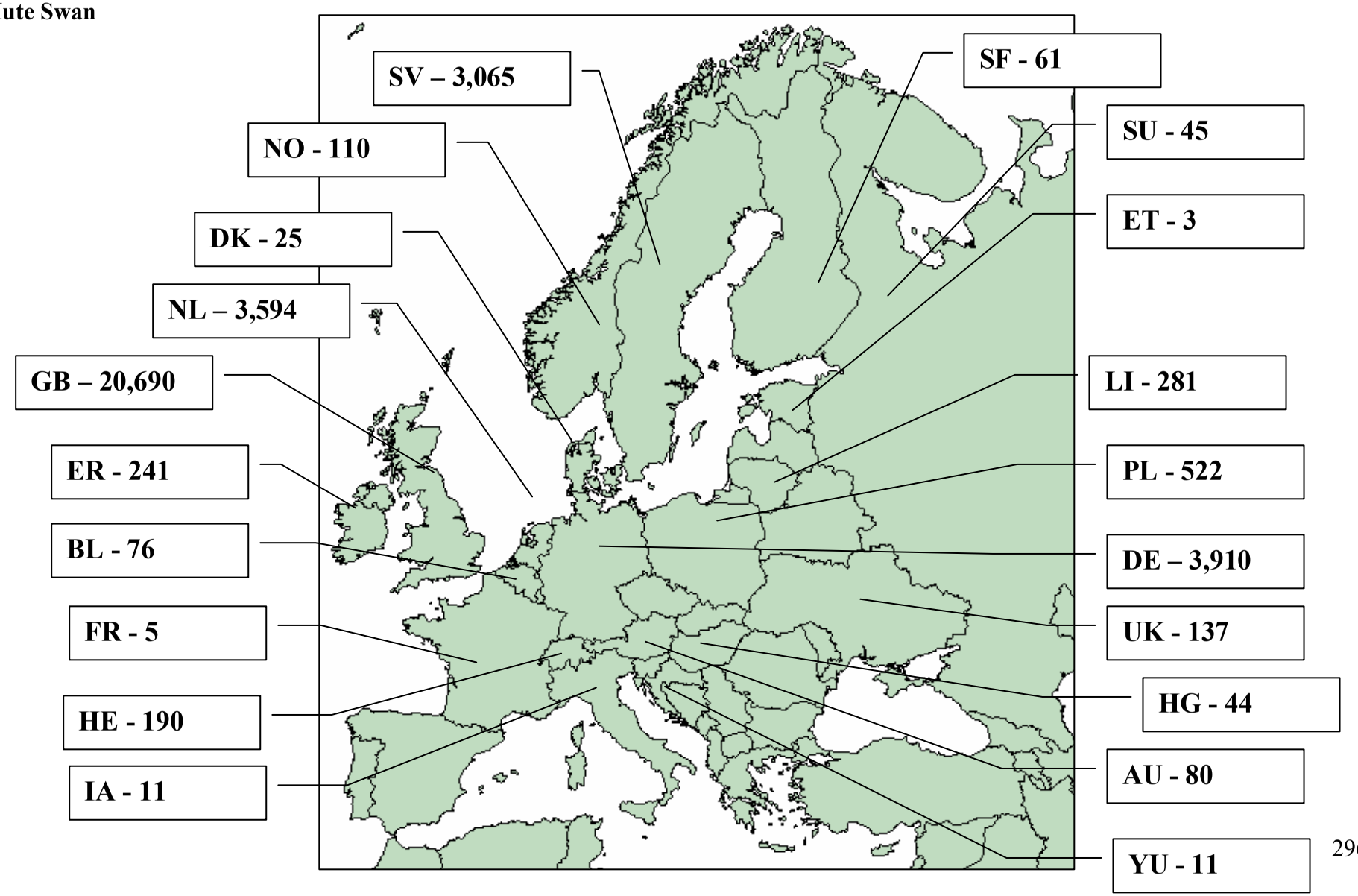
Glaucous Gull	*Larus hyperboreus*	ML	SL	M	N	N	N	0
Great Black-backed Gull	*Larus marinus*	ML	SM	H	N	N	N	0
Kittiwake	*Rissa tridactyla*	M	SL	L	N	N	N	0
Gull-billed Tern	*Sterna nilotica*	MF	SL	L	N	Y	Y	0
Caspian Term	*Sterna caspia*	MF	SL	L	N	Y	Y	0
Lesser Crested Tern	*Sterna bengalensis*	ML	SL	L	N	N	N	0
Sandwich Tern	*Sterna sandvicensis*	ML	SL	L	N	N	N	0
Roseate Tern	*Sterna dougallii*	ML	SL	L	N	N	N	0
Common Tern	*Sterna hirundo*	MF	SM	L	N	Y	Y	0
Arctic Tern	*Sterna paradisaea*	ML	SL	L	N	N	N	0
Little Tern	*Sterna albifrons*	MF	SL	L	N	N	N	0
Whiskered Tern	*Childonias hybridus*	F	?	?	N	Y	Y	0
Black Tern	*Childonias niger*	FM	SM	L	N	Y	Y	0
White-winged Tern	*Chidonias leucopterus*	F	SM	L	N	Y	Y	0
Common Gulllemot	*Uria aalge*	M	MM	M	N	N	N	0
Razorbill	*Alca torda*	M	MM	M	N	N	N	0
Black Guillemot	*Cepphus grylle*	M	SL	L	N	N	N	0
Atlantic Puffin	*Fratercula arctica*	M	MM	M	N	N	N	0

* Information on behaviour and ecology has mainly been based on expert judgement (information of at least three experts) and on ornithological handbooks, principally Cramp & Simmons 1986, 1993, 1994.
** Information on migration behaviour is drawn from Pavlov et al. 1979, 1985, 1989,1997, Roggeman et al. 1995, Scott & Rose 1996, Snow & Perrins 1998, Madsen et al. 1999, Fransson & Pettersson 2001,Wetlands International 2002, Wernham et al. 2002, Bakken et al. 2003, Kear 2004, Stroud et al. 2004, Veen et al. 2005.
***Information on contact risk with poultry is based on expert judgement, provided by the members of the Scientific Working Group of the EC Birds Directive's Ornis Committee from the United Kingdom, Ireland, Portugal, Czech Republic, Slovenia, Austria, Germany, The Netherlands and Estonia.

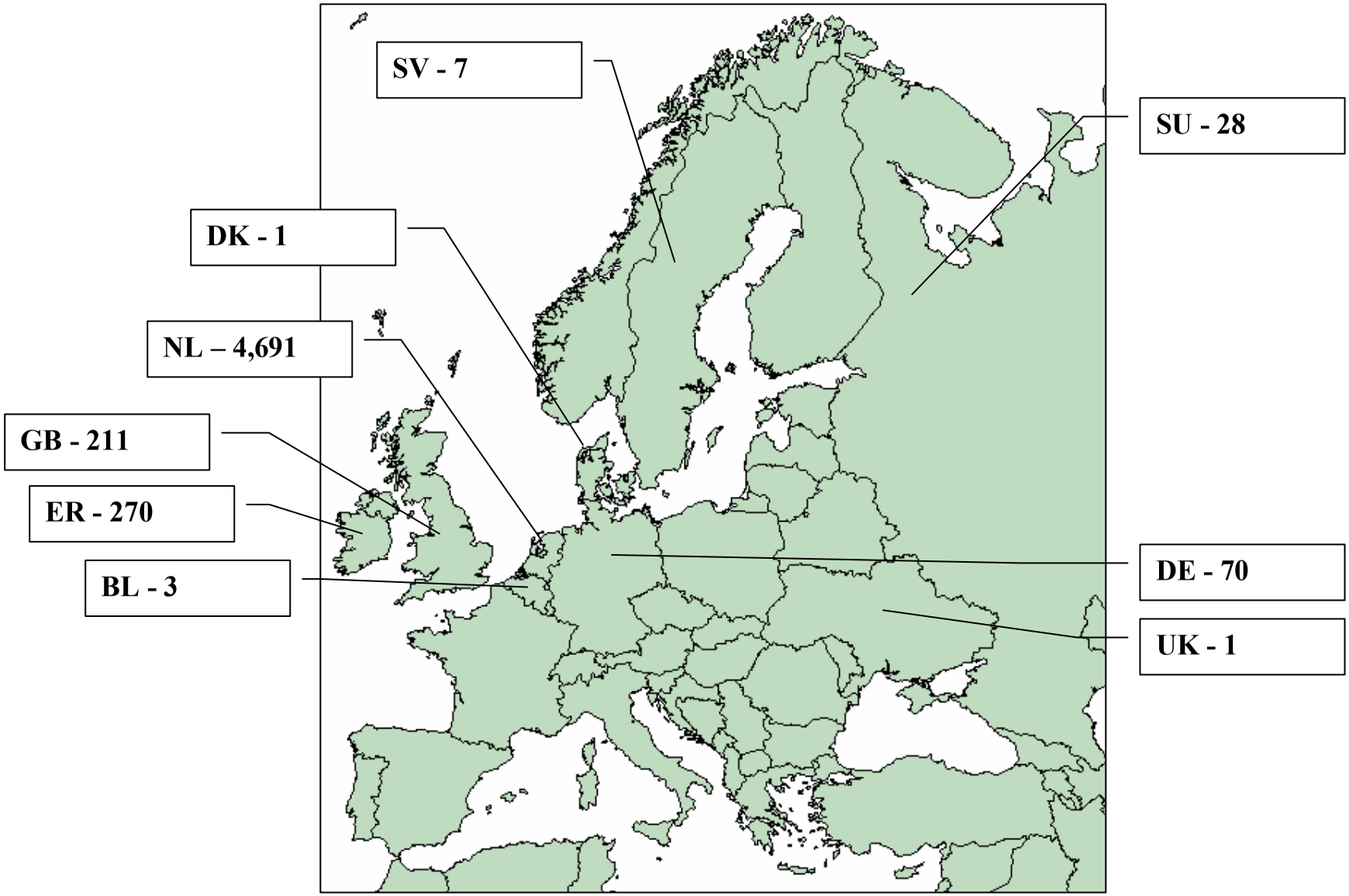
Annex 2.1

Country of ringing and numbers of recoveries of birds featured in maps of finding locations

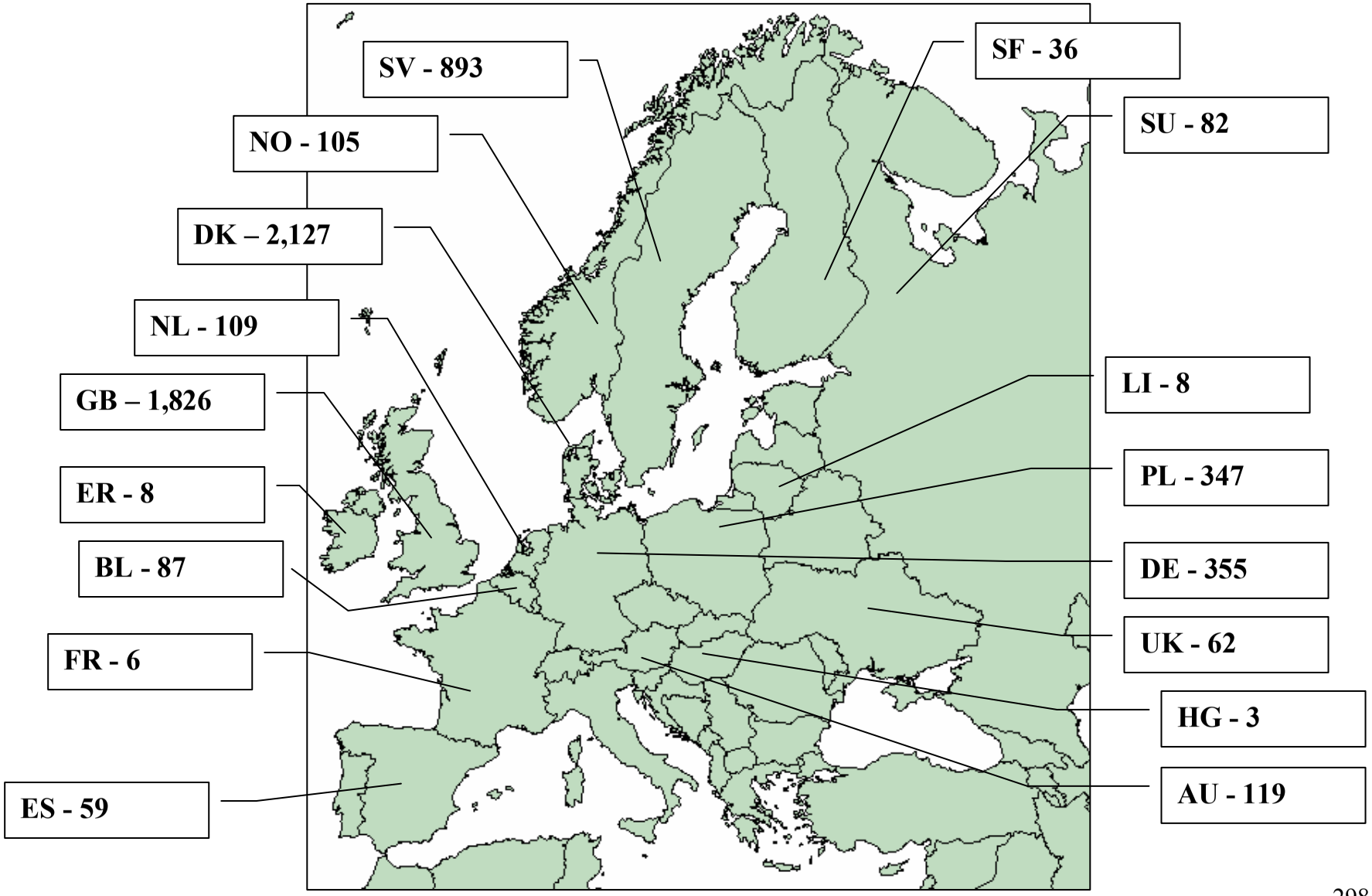
Mute Swan



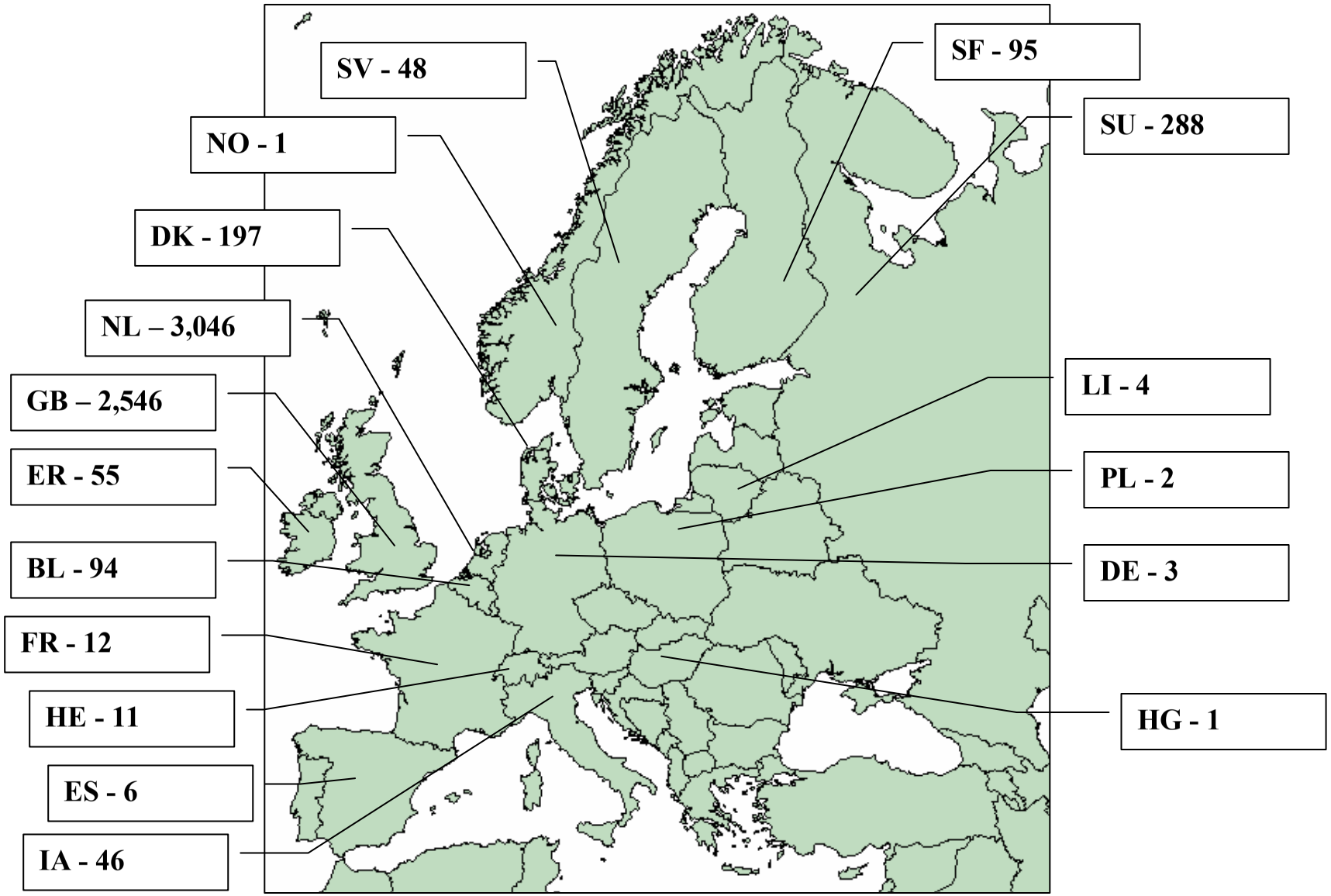
Greater White-fronted Goose



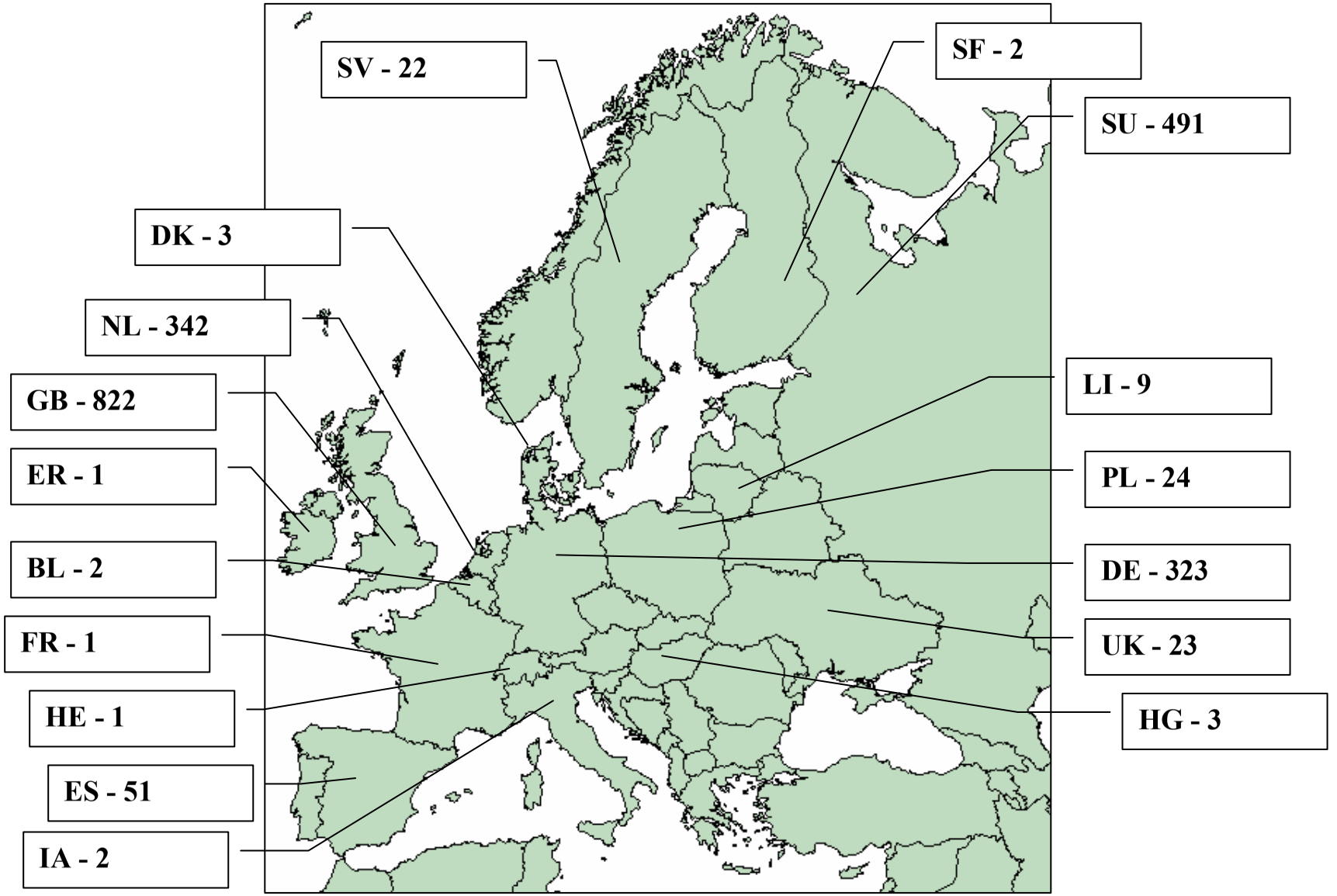
Greylag Goose



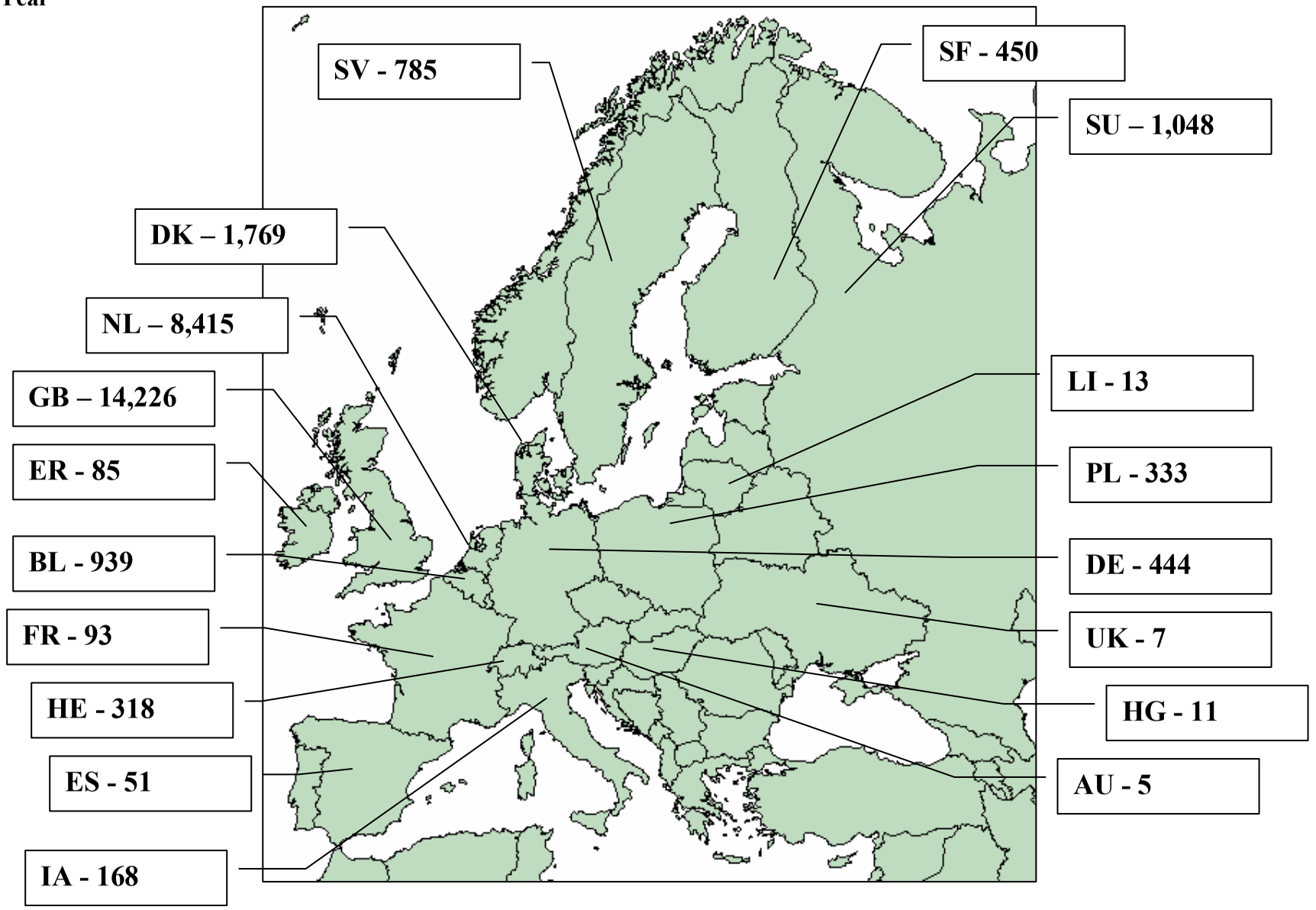
Eurasian Wigeon



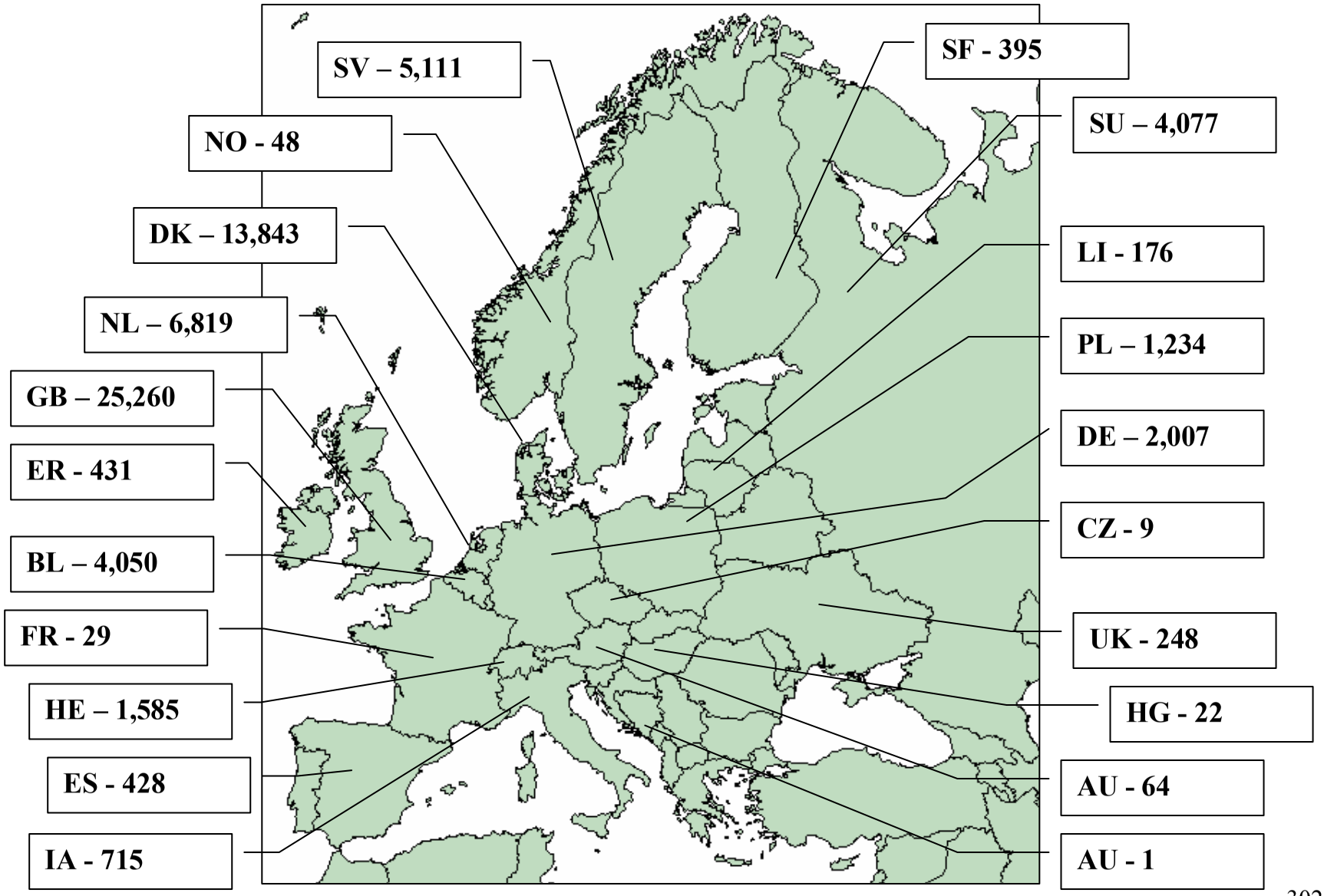
Gadwall


SV - 22
SF - 2
SU - 491
DK - 3
NL - 342
GB - 822
ER - 1
BL - 2
FR - 1
HE - 1
ES - 51
IA - 2
LI - 9
PL - 24
DE - 323
UK - 23
HG - 3

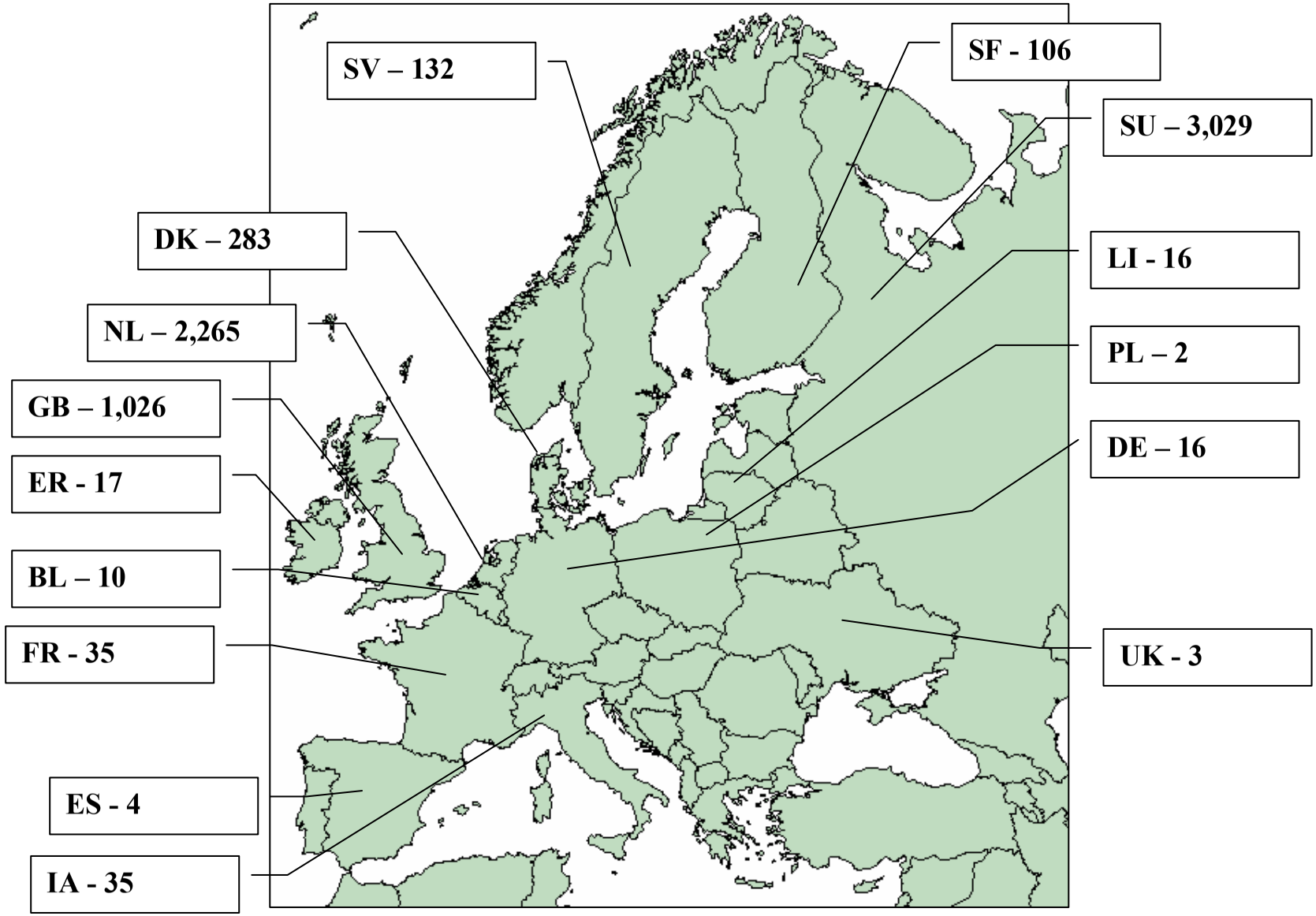
Common Teal


SV - 785
SF - 450
SU – 1,048
DK – 1,769
NL – 8,415
GB – 14,226
ER - 85
LI - 13
PL - 333
BL - 939
DE - 444
FR - 93
UK - 7
HE - 318
HG - 11
ES - 51
AU - 5
IA - 168

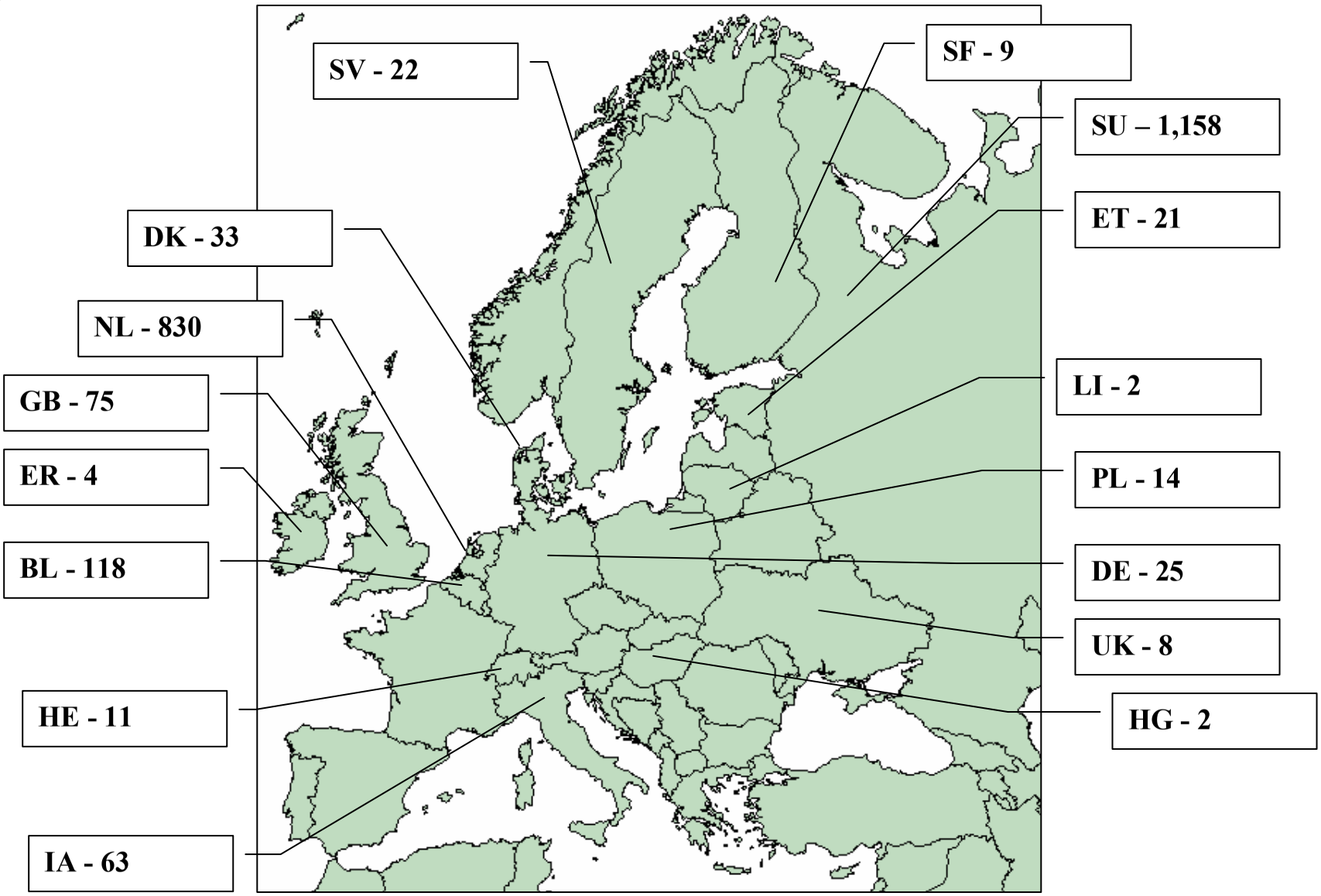
Mallard


SV – 5,111
SF - 395
NO - 48
SU – 4,077
DK – 13,843
LI - 176
NL – 6,819
PL – 1,234
GB – 25,260
DE – 2,007
ER - 431
CZ - 9
BL – 4,050
FR - 29
UK - 248
HE – 1,585
HG - 22
ES - 428
AU - 64
IA - 715
AU - 1

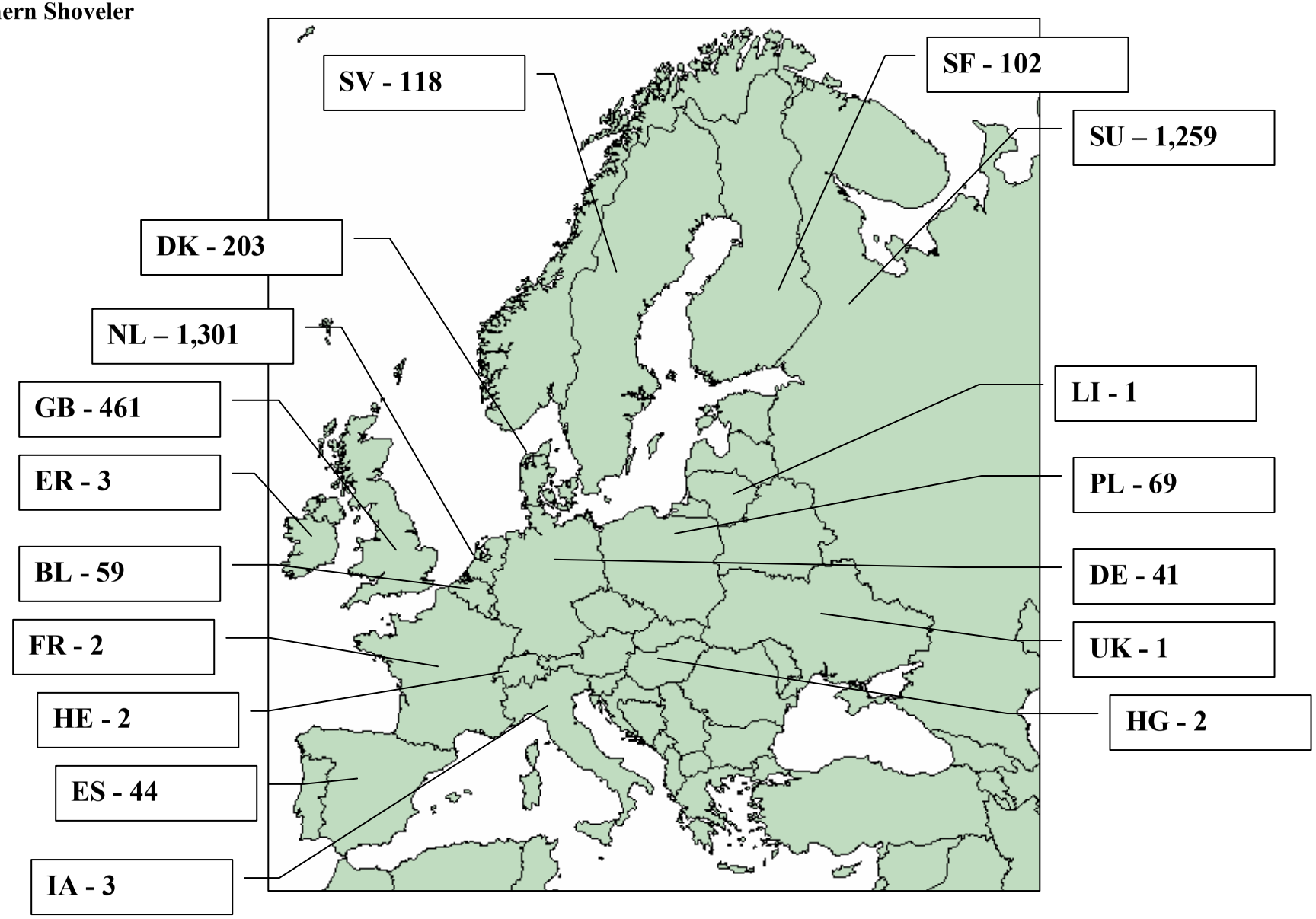
Northern Pintail



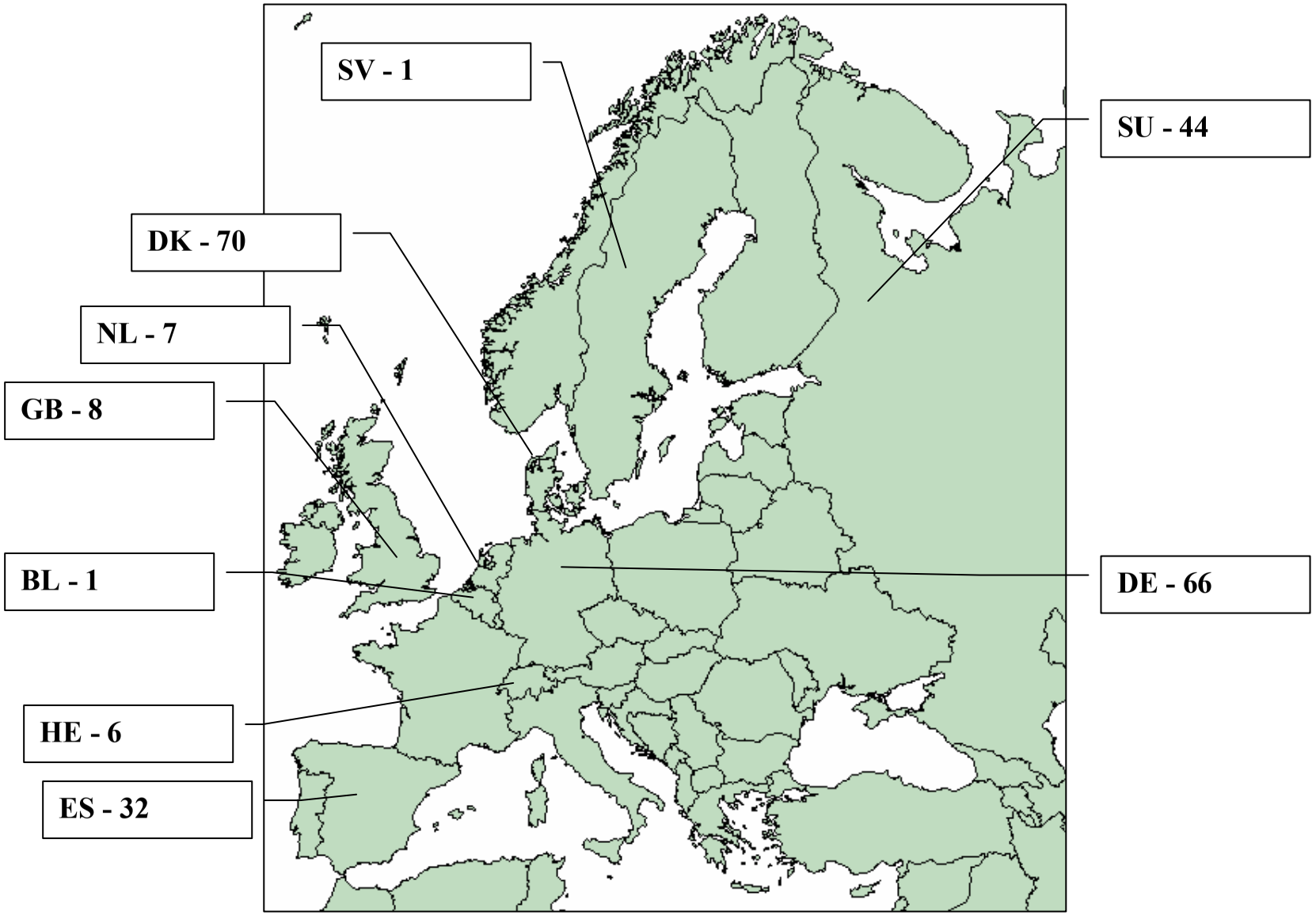
Garganey


SV - 22
SF - 9
SU – 1,158
ET - 21
DK - 33
NL - 830
GB - 75
ER - 4
BL - 118
LI - 2
PL - 14
DE - 25
UK - 8
HG - 2
HE - 11
IA - 63

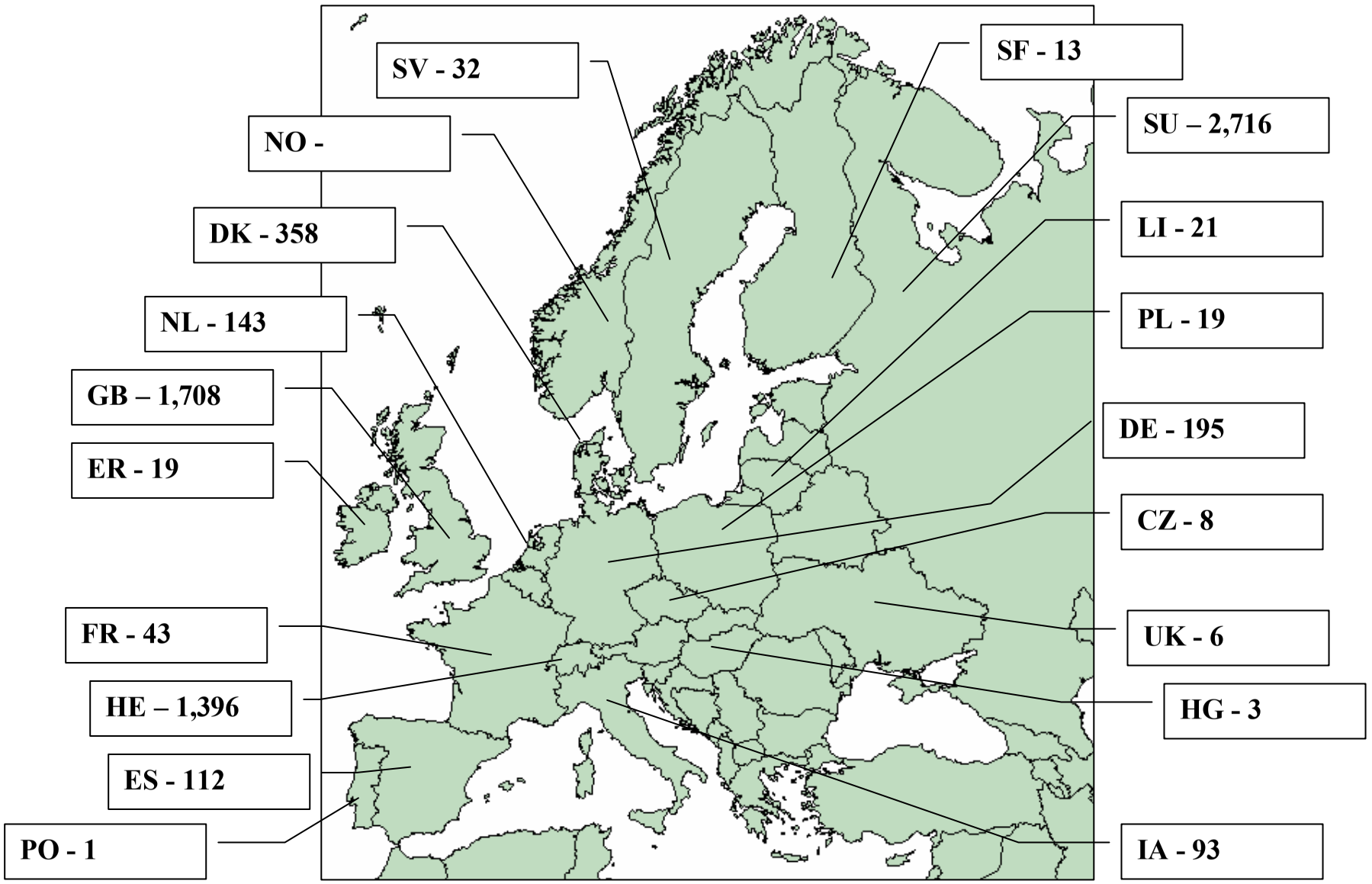
Northern Shoveler



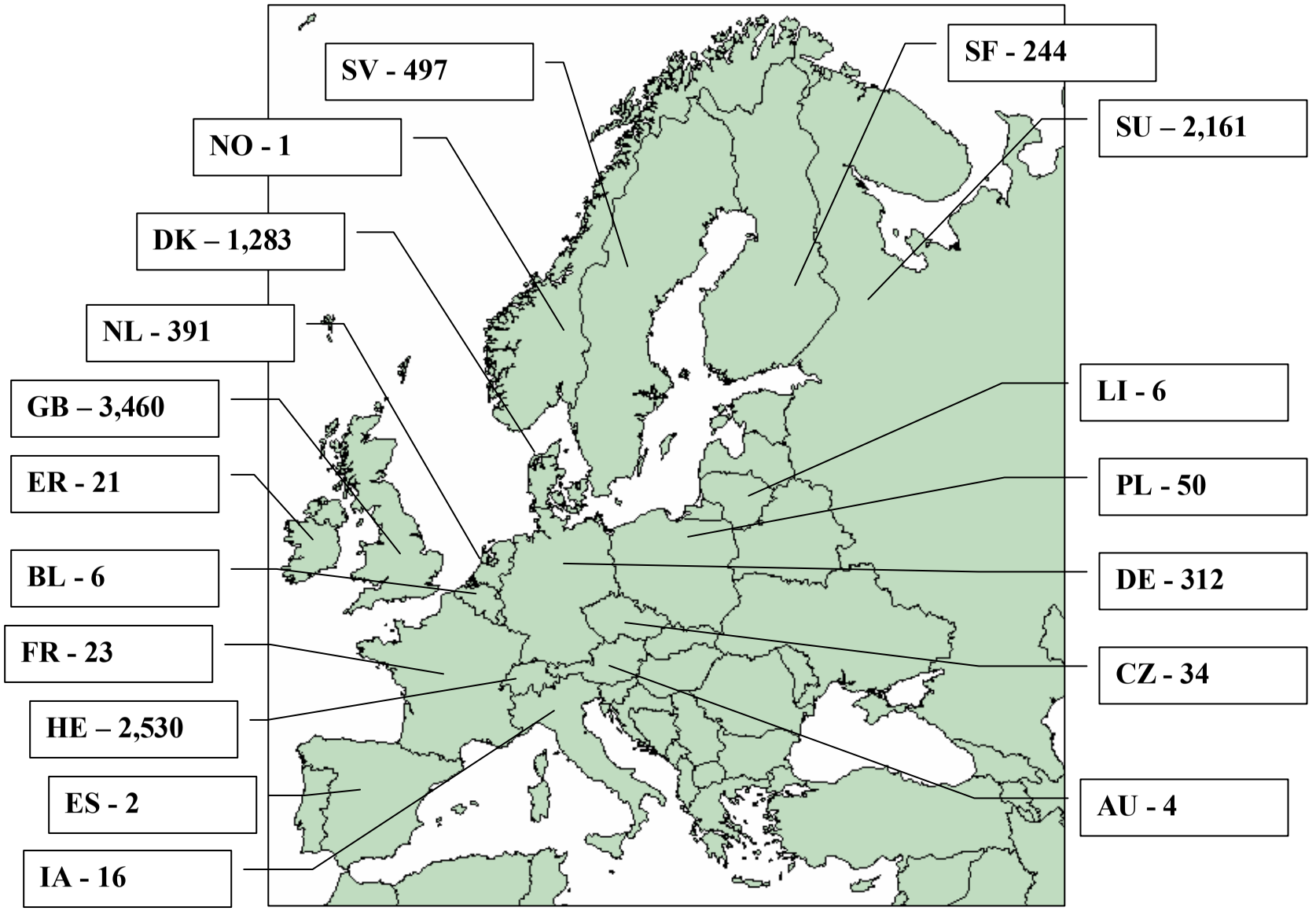
Red-crested Pochard



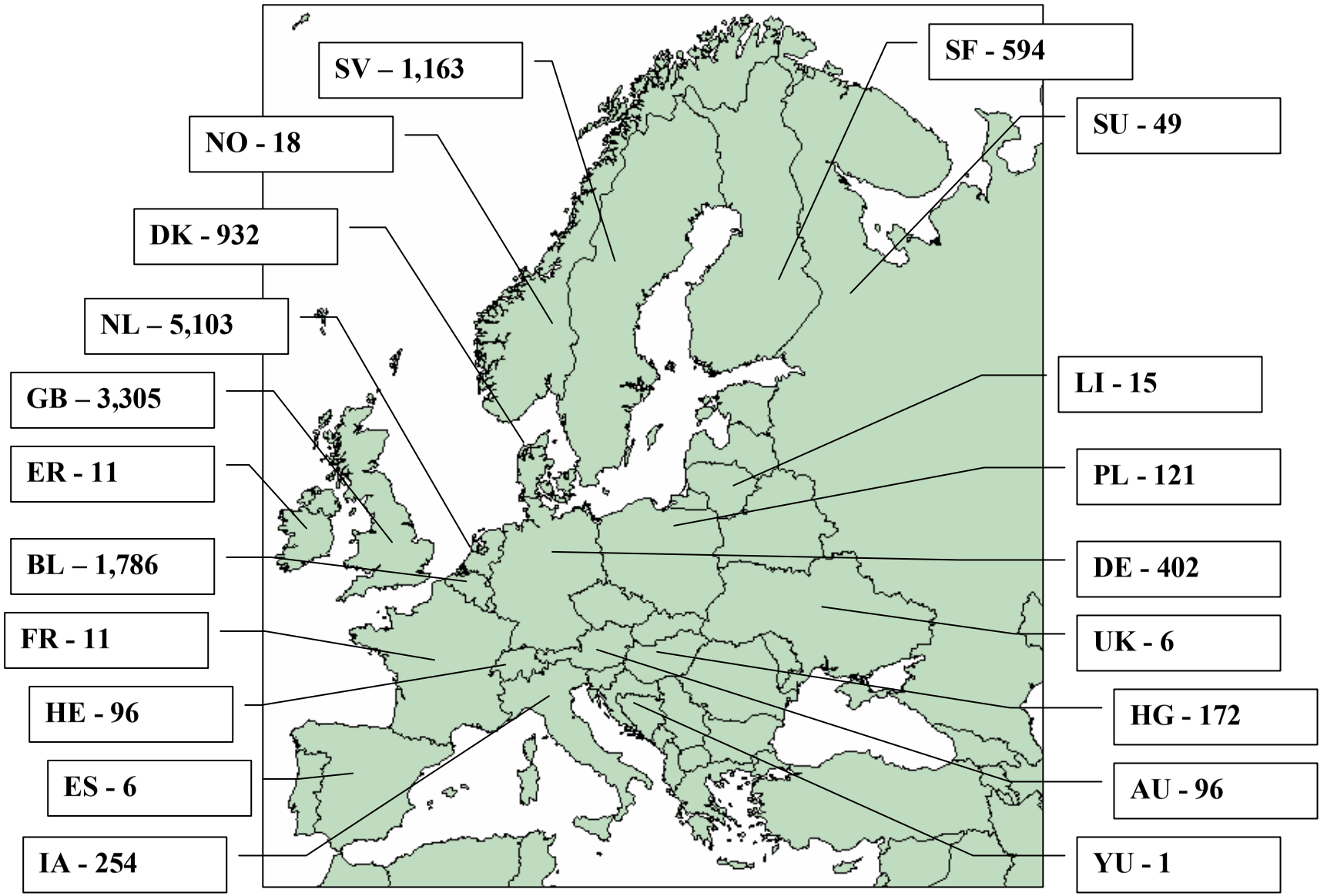
Common Pochard



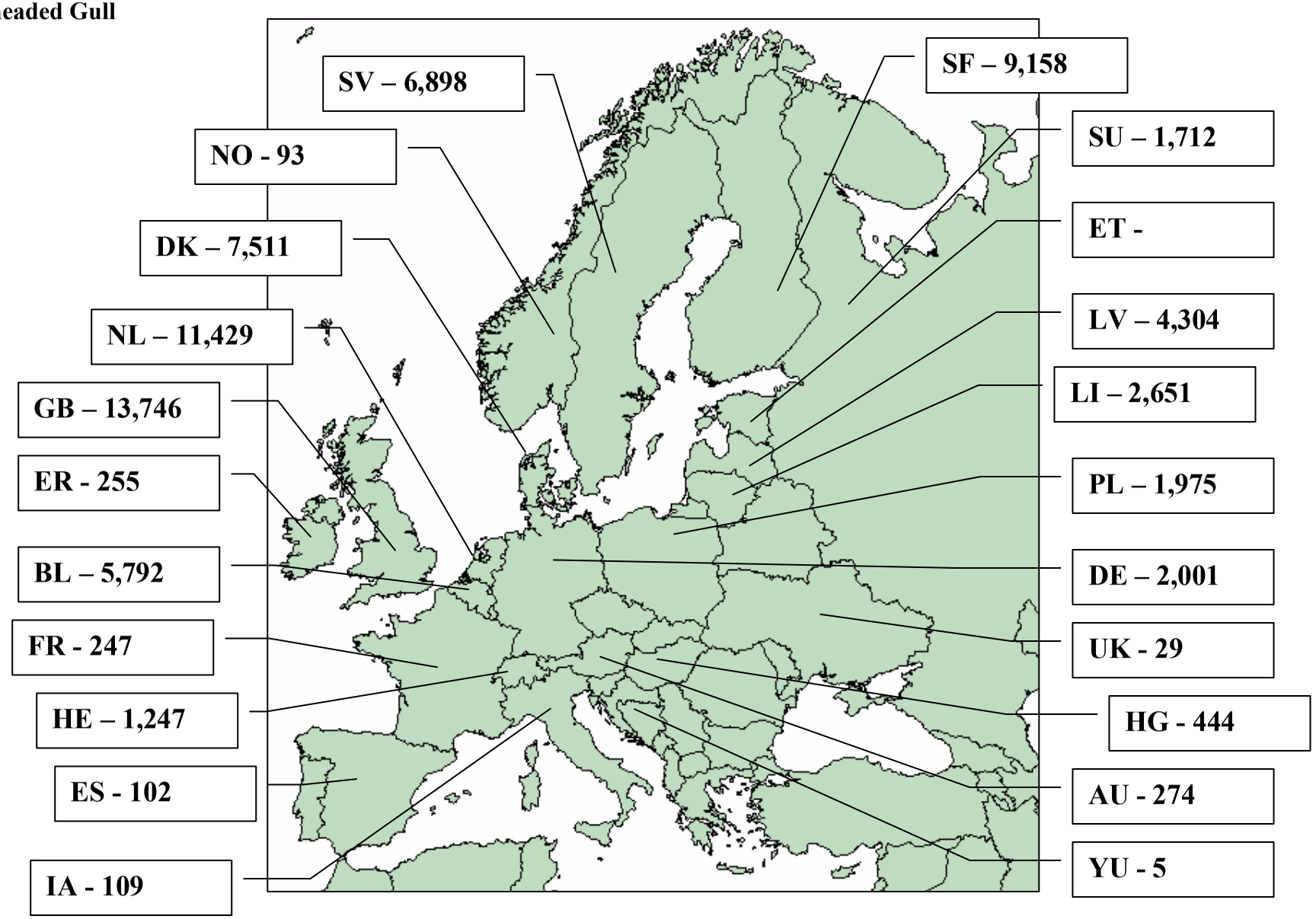
Tufted Duck


SV - 497
SF - 244
NO - 1
SU – 2,161
DK – 1,283
NL - 391
LI - 6
GB – 3,460
ER - 21
PL - 50
BL - 6
DE - 312
FR - 23
CZ - 34
HE – 2,530
ES - 2
AU - 4
IA - 16

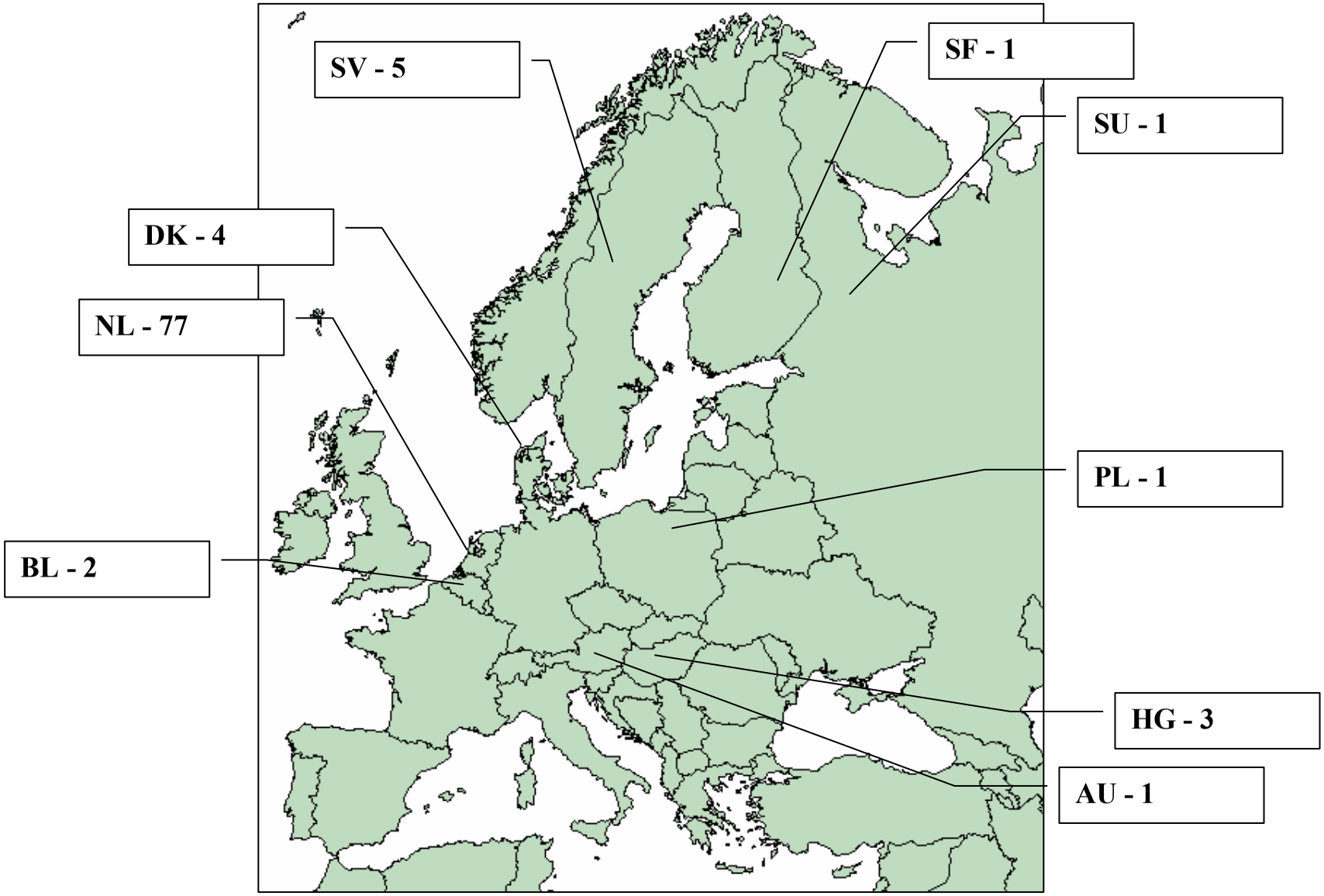
Lapwing


SV – 1,163
SF - 594
NO - 18
SU - 49
DK - 932
NL – 5,103
GB – 3,305
LI - 15
ER - 11
PL - 121
BL – 1,786
DE - 402
FR - 11
UK - 6
HE - 96
HG - 172
ES - 6
AU - 96
IA - 254
YU - 1

Black-headed Gull



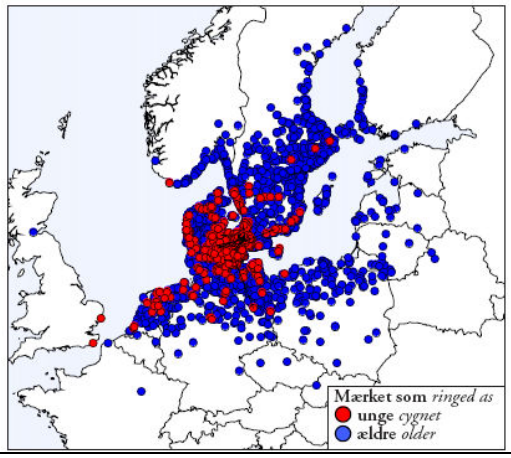
Black Tern



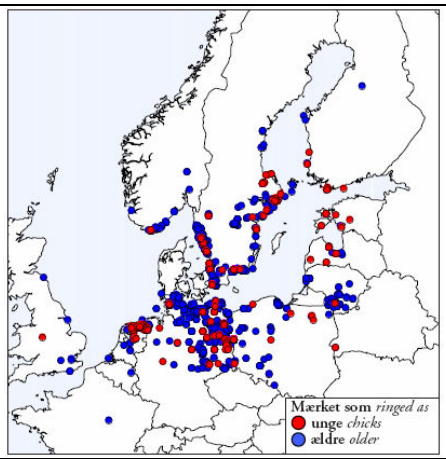
Annex 2.2
Published ring recoveries of the 17 High Risk species covered in Chapter 2

Mute Swan

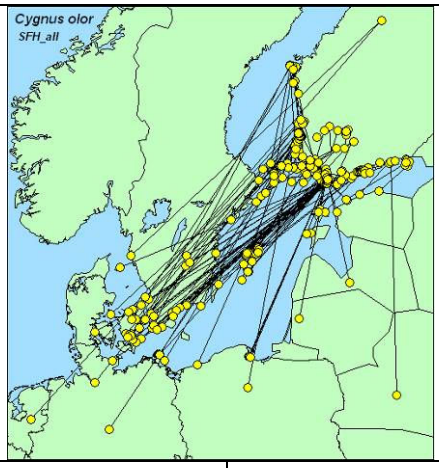
From Denmark (dead)



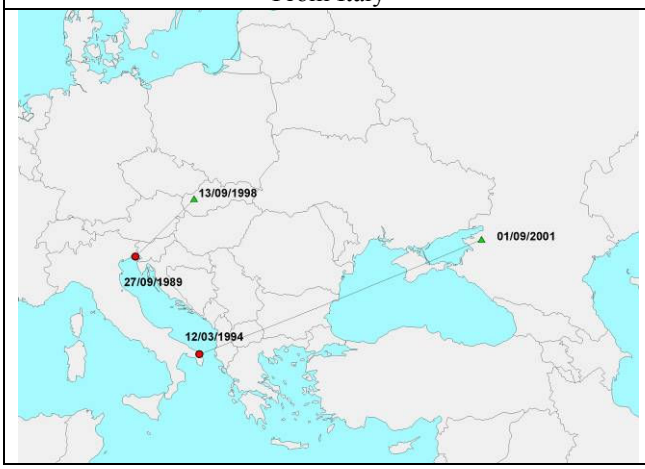
To Denmark



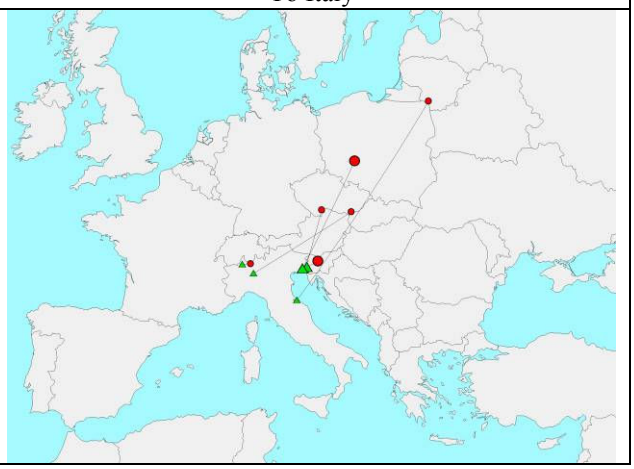
To and from Finland

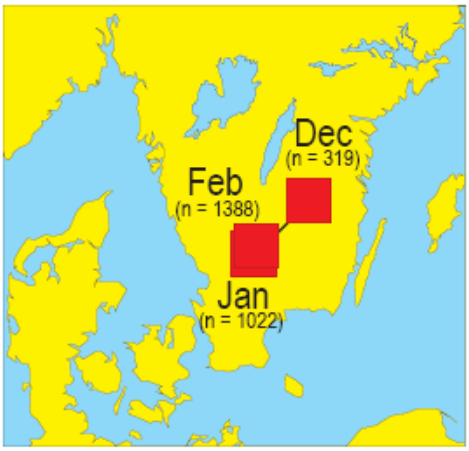


From Italy



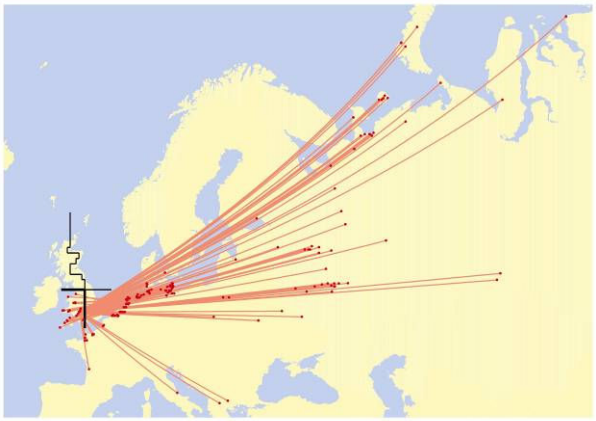
To Italy



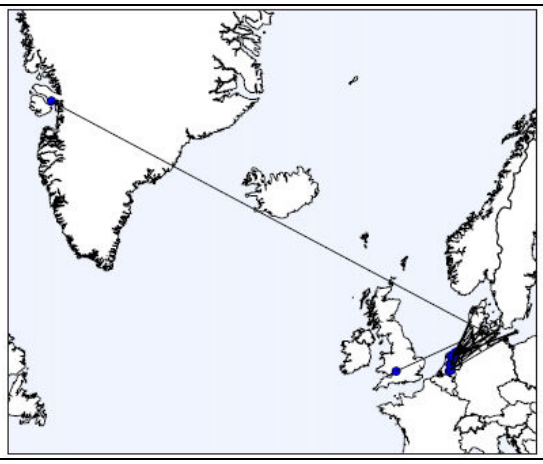
From Sweden (mean monthly locations)	From Sweden (mean monthly locations)
	

Greater White-fronted Goose

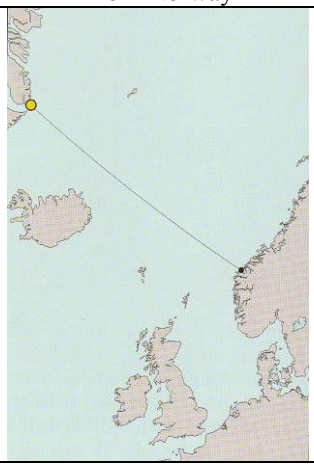
To and from SW England (*albifrons* only)



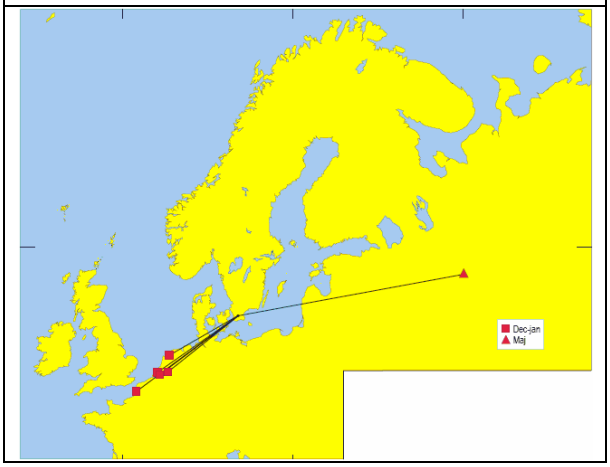
To Denmark



From Norway



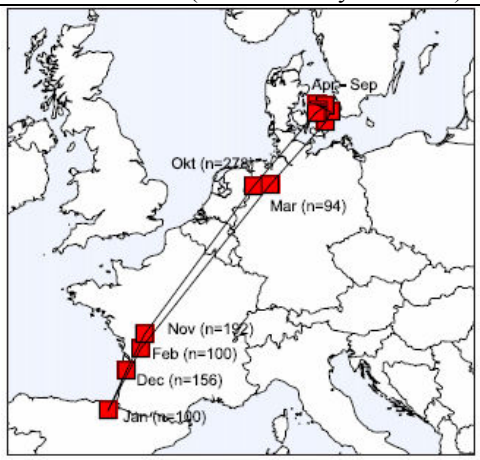
From Sweden



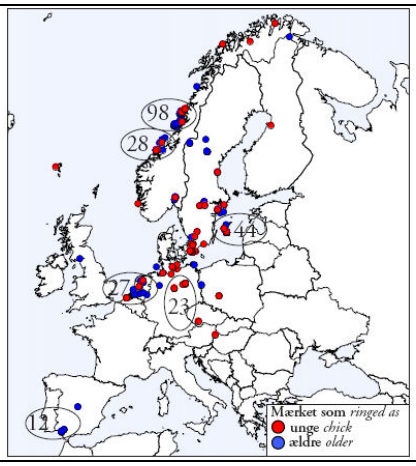
Greylag Goose

To and from Britain & Ireland

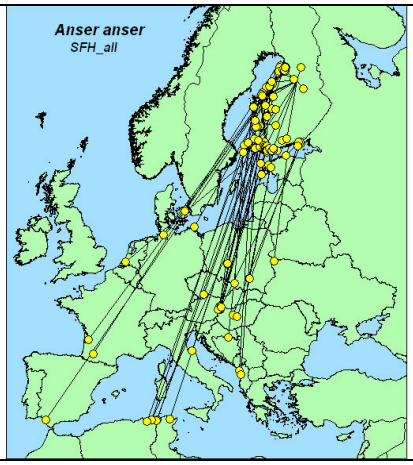
From Denmark (mean monthly locations)



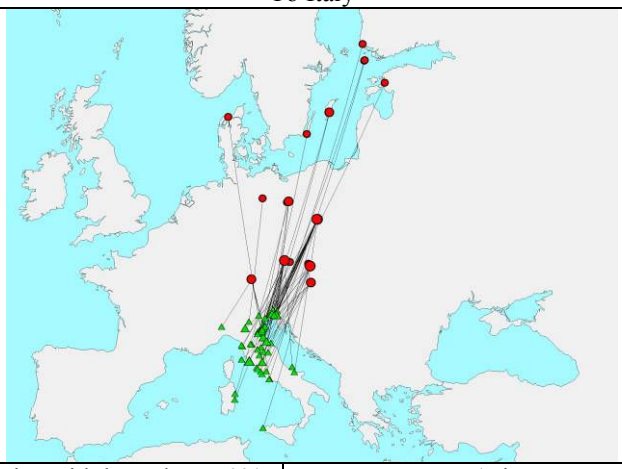
To Denmark



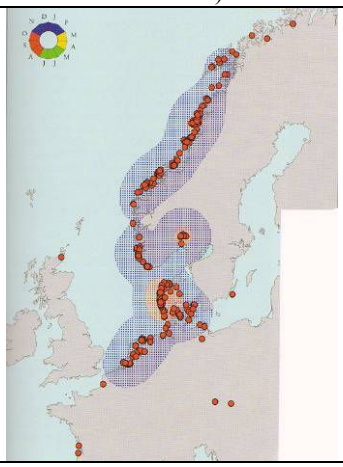
To and from Finland



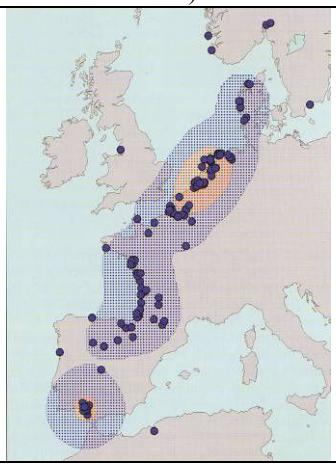
To Italy



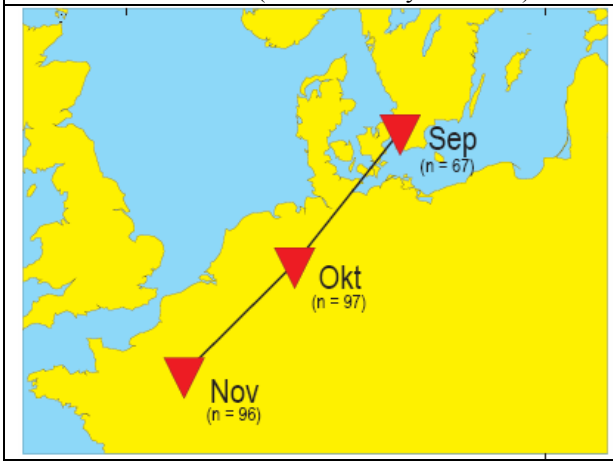
From Norway (autumn recoveries with kernels at 50% and 95%)



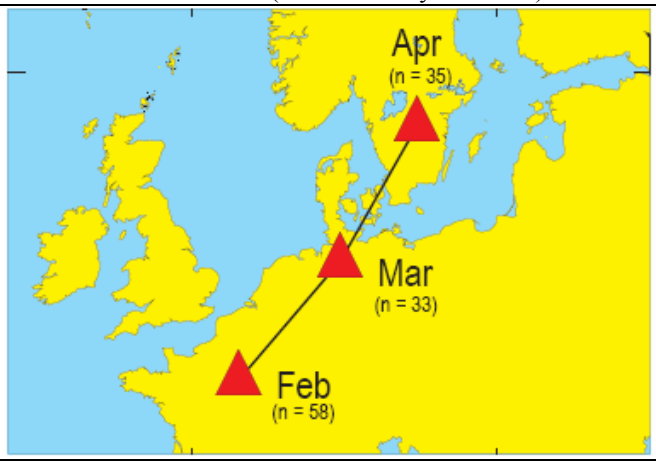
From Norway (winter recoveries with kernels at 50% and 95%)



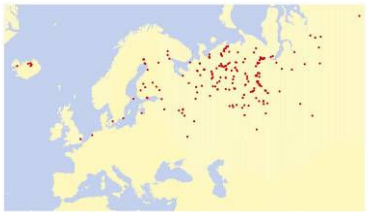
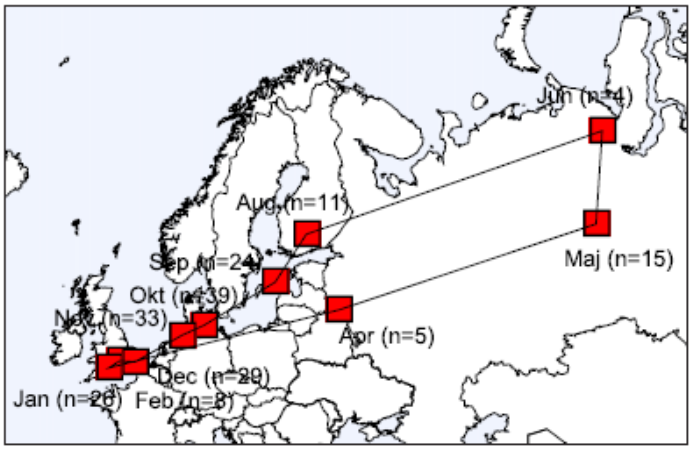
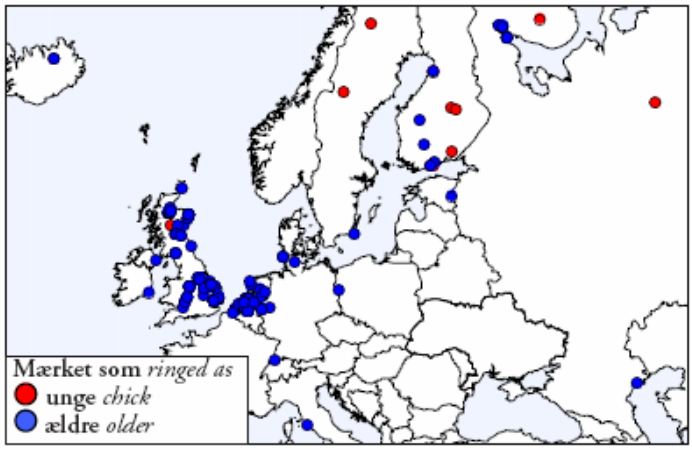
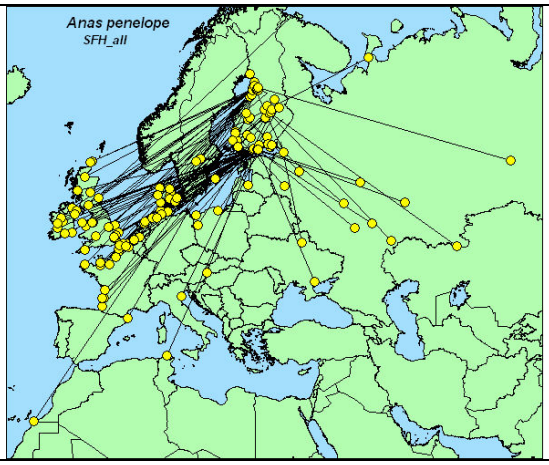
From Sweden (mean monthly locations)

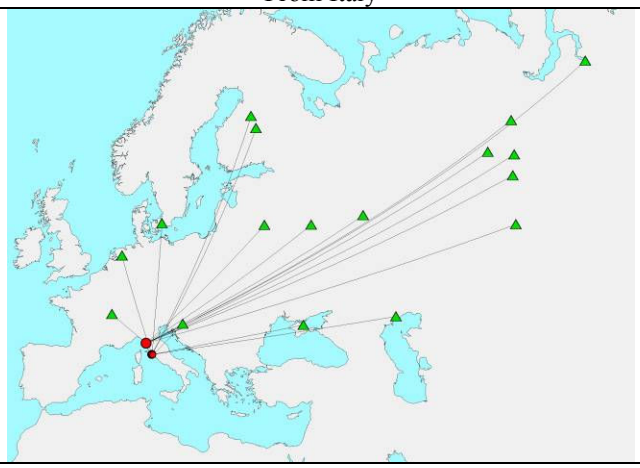
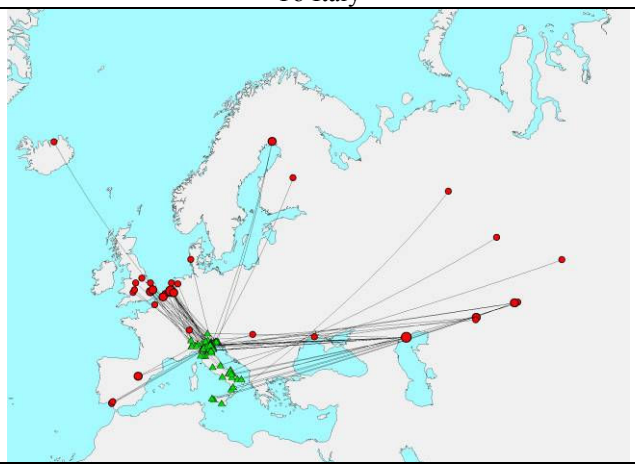


From Sweden (mean monthly locations)

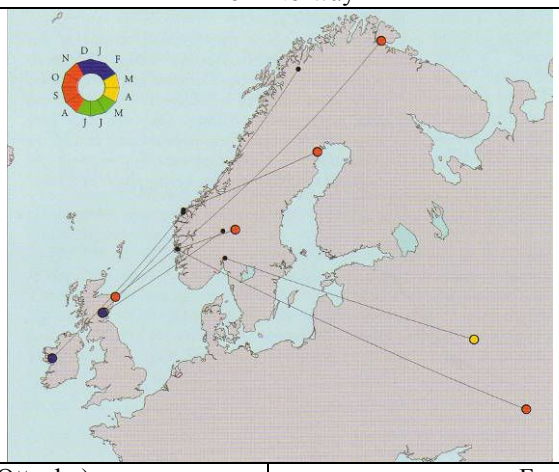


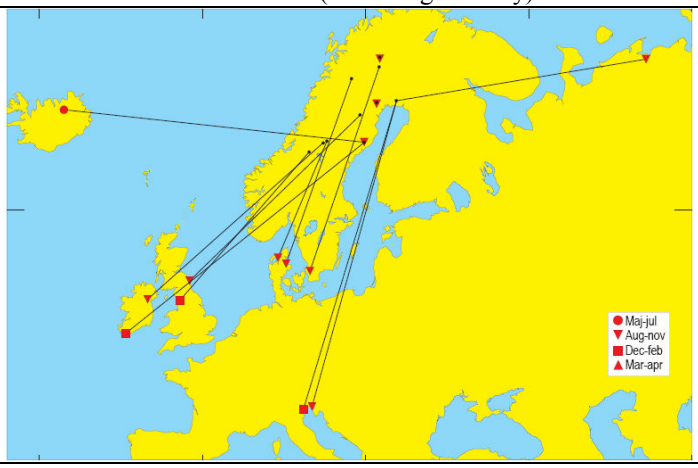
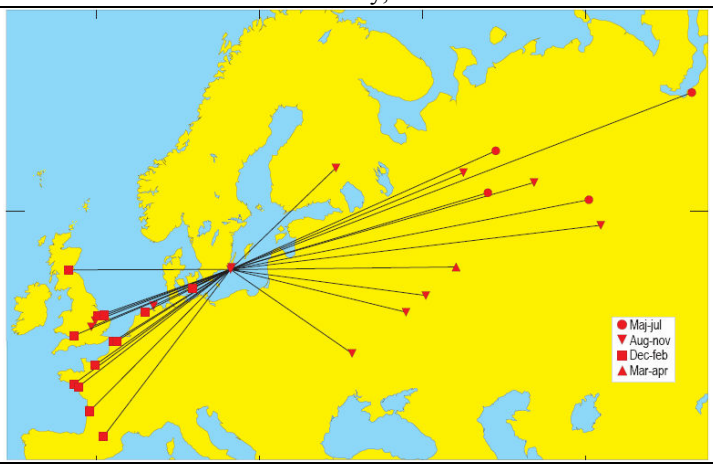
Eurasian Wigeon

<table>
<tr><td colspan="4">To and from Britain & Ireland</td></tr>
<tr><td>Locations in May to June</td><td>  </td><td>Locations in July to August</td><td>  </td></tr>
<tr><td>Locations in September to October</td><td>  </td><td>Locations in March to April</td><td>  </td></tr>
<tr><td colspan="2">From Denmark (mean monthly locations)</td><td colspan="2">To Denmark</td></tr>
<tr><td colspan="2"> 
</td><td colspan="2"> 
</td></tr>
<tr><td colspan="4">To and from Finland</td></tr>
<tr><td colspan="4"> 
</td></tr>
</table>

From Italy	To Italy
	

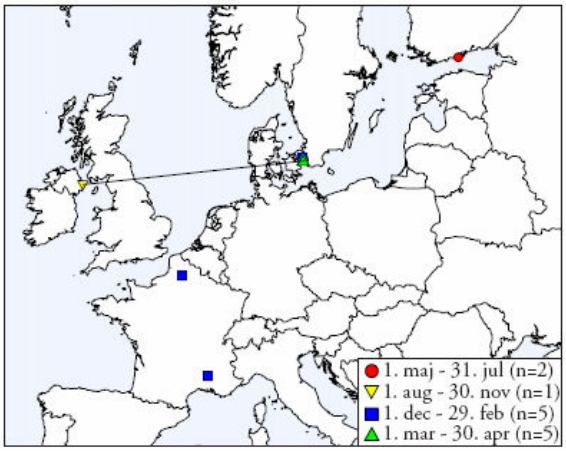
From Norway



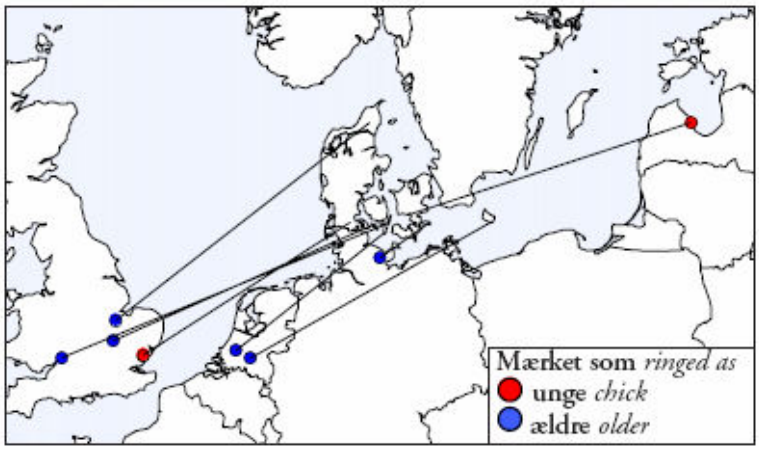
From Sweden (excluding Ottenby)	From Ottenby, Sweden
	

Gadwall

From Denmark

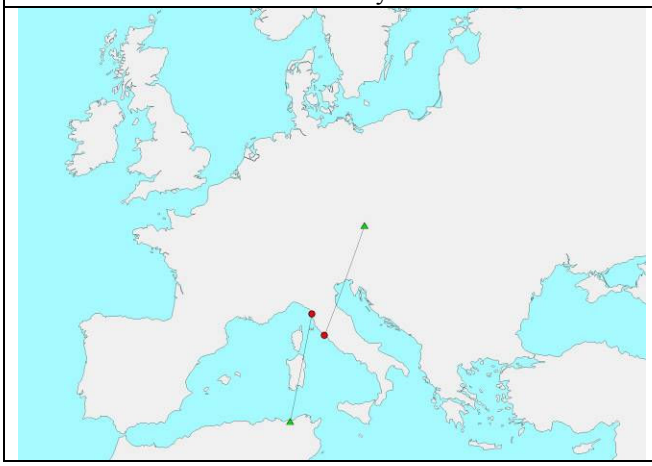


To Denmark

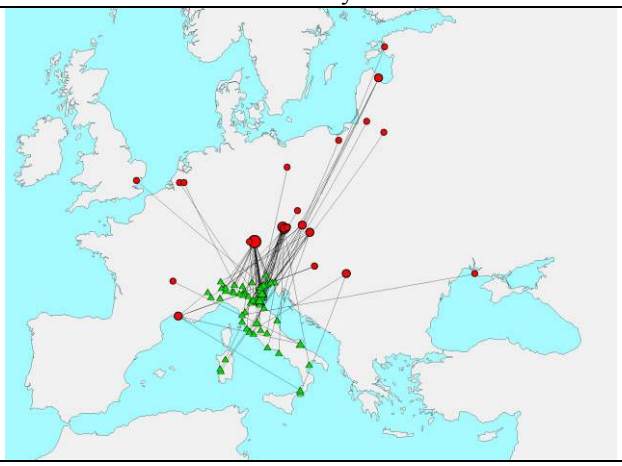


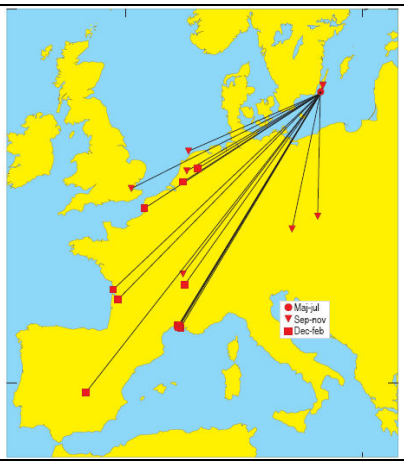
To and from Finland

From Italy



To Italy

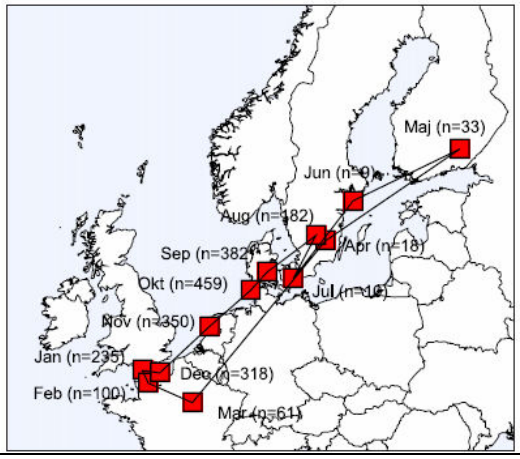


From Sweden


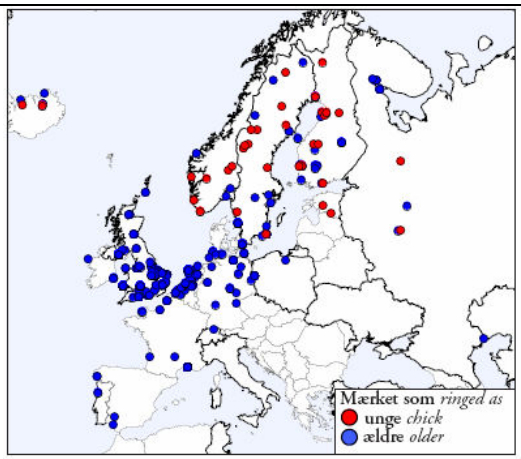
Common Teal

To and from Britain & Ireland (May to June)

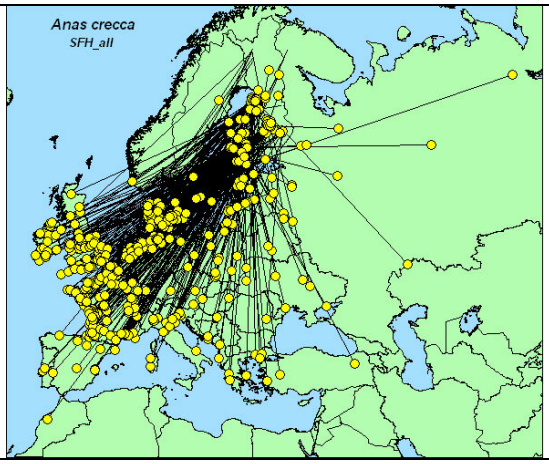
From Denmark (mean monthly locations)

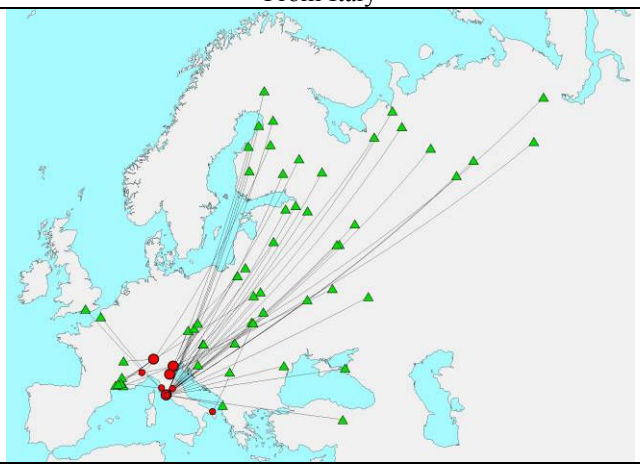
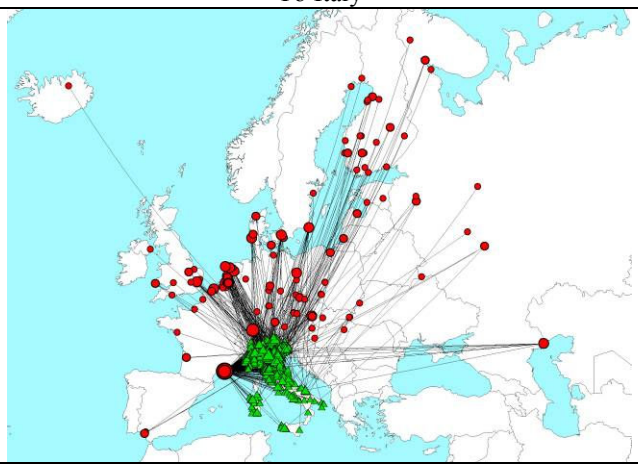
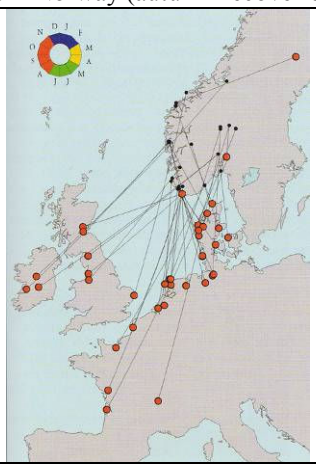
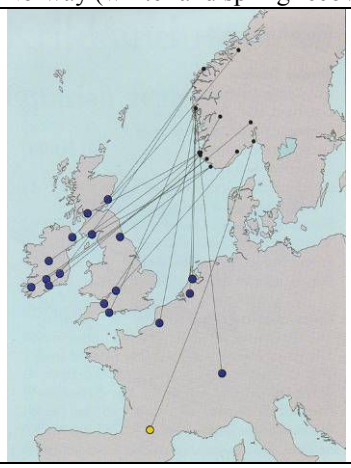
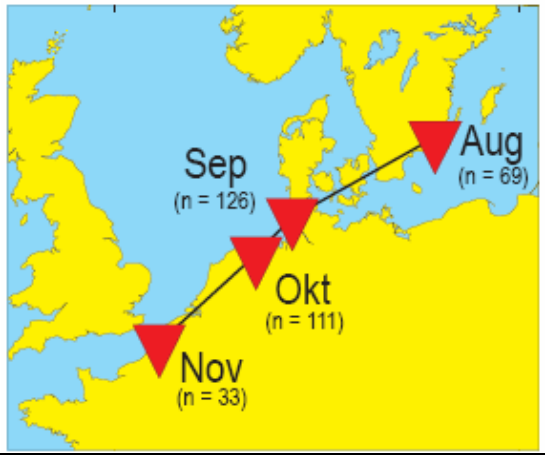
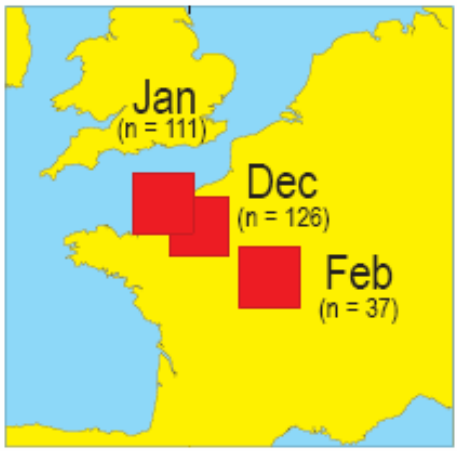


To Denmark



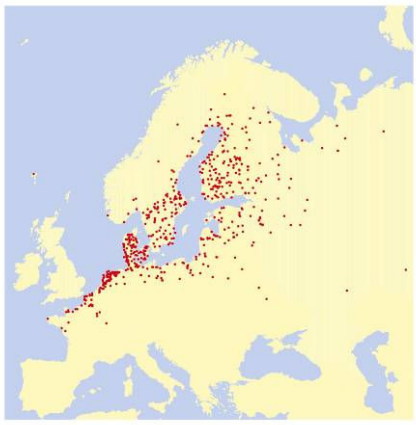
To and from Finland



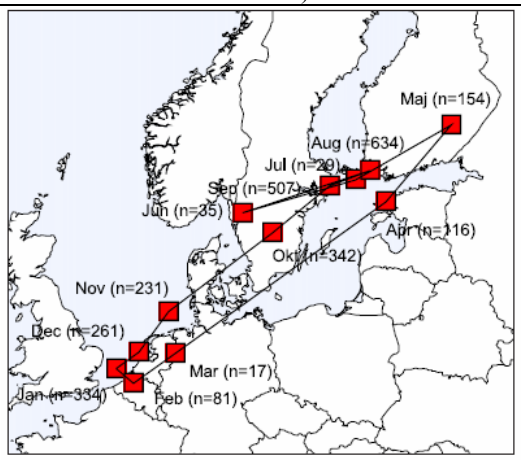
From Italy	To Italy
	
From Norway (autumn recoveries)	From Norway (winter and spring recoveries)
	
From Sweden (mean monthly locations)	From Sweden (mean monthly locations)
	

Mallard

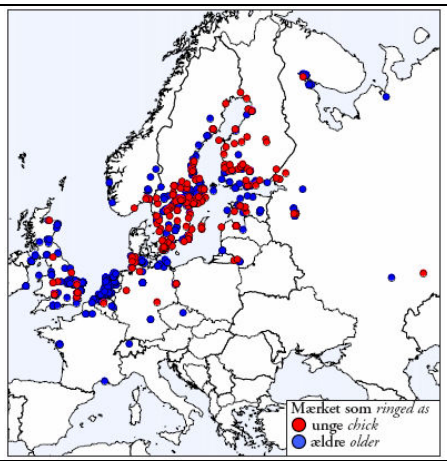
From Britain & Ireland (found in breeding season)



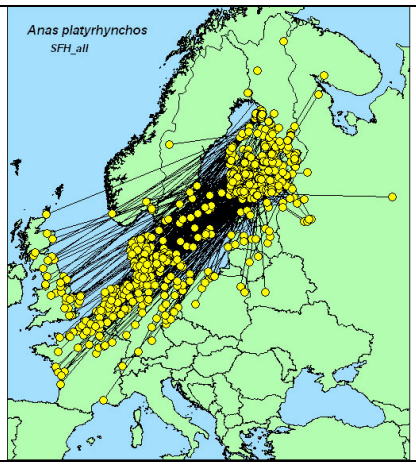
From Denmark (mean monthly locations for recoveries >200km)

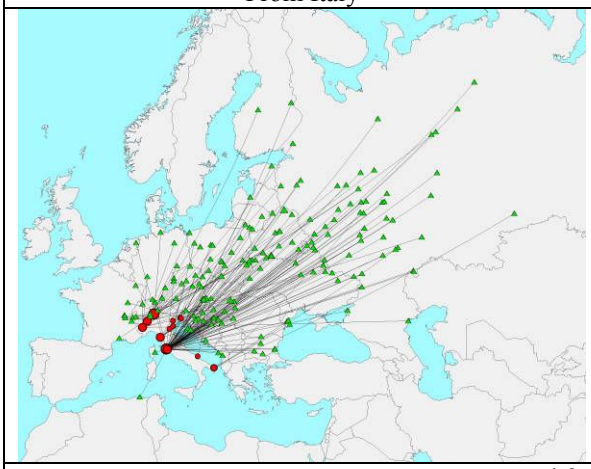
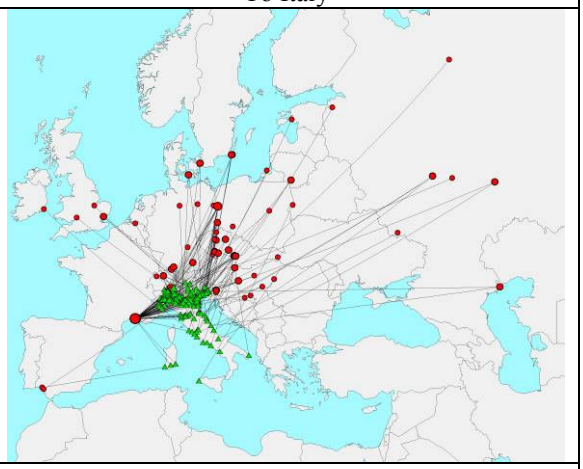
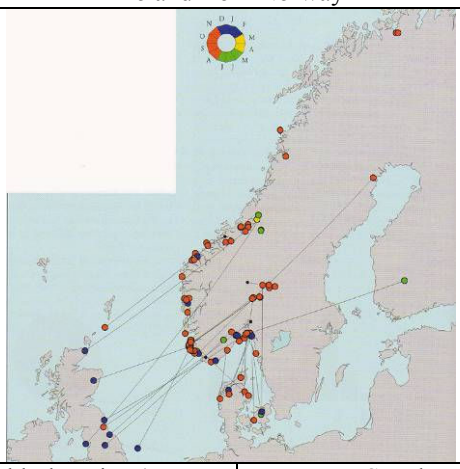
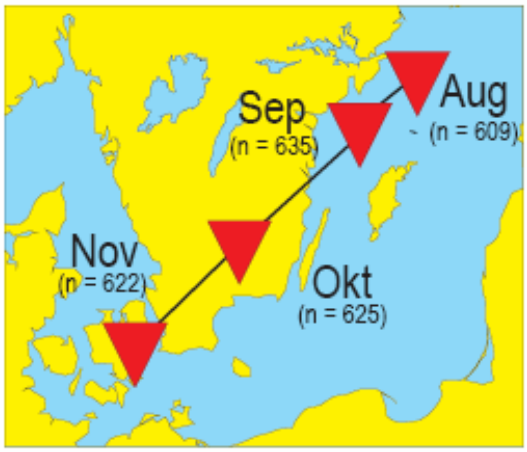
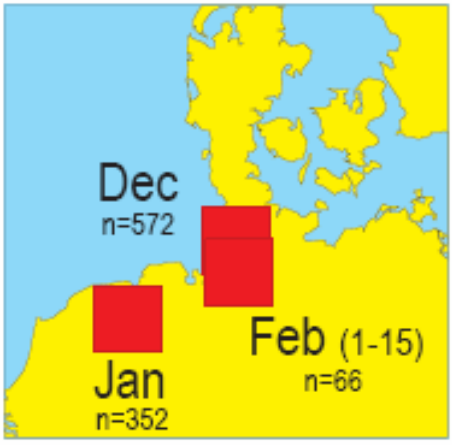


To Denmark

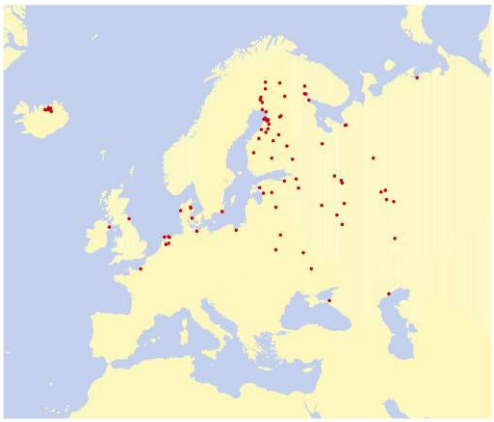
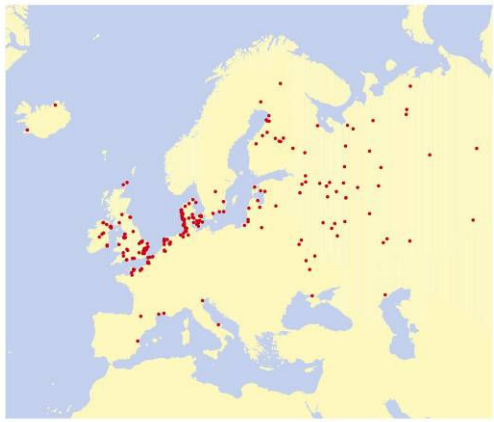
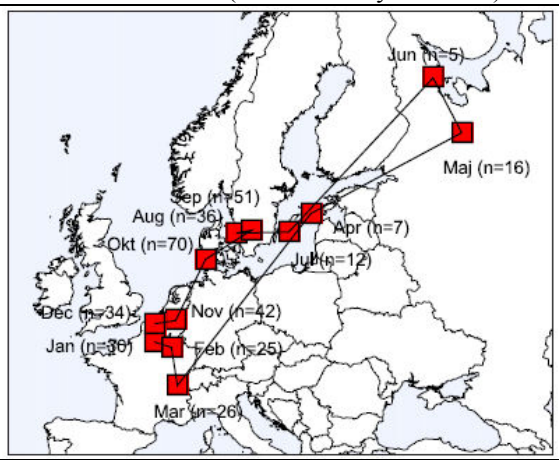
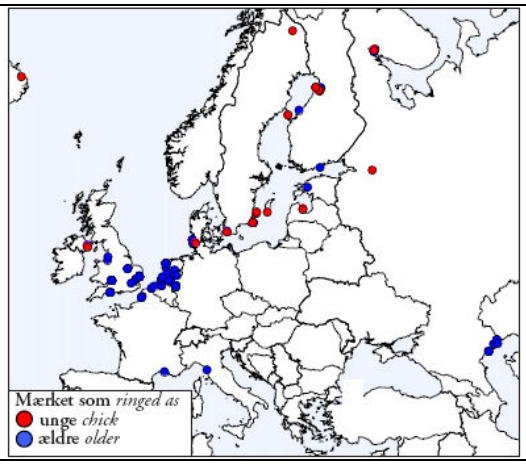
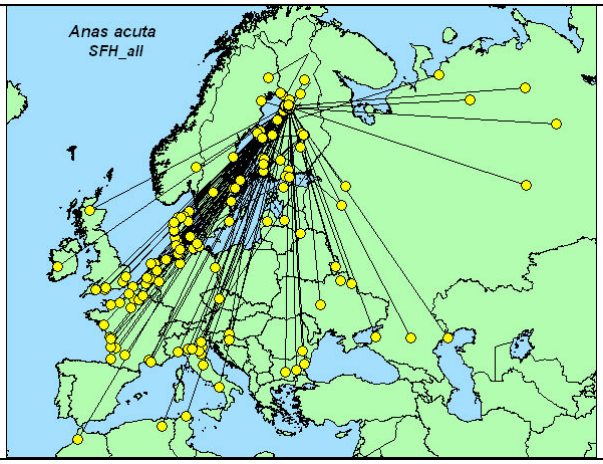


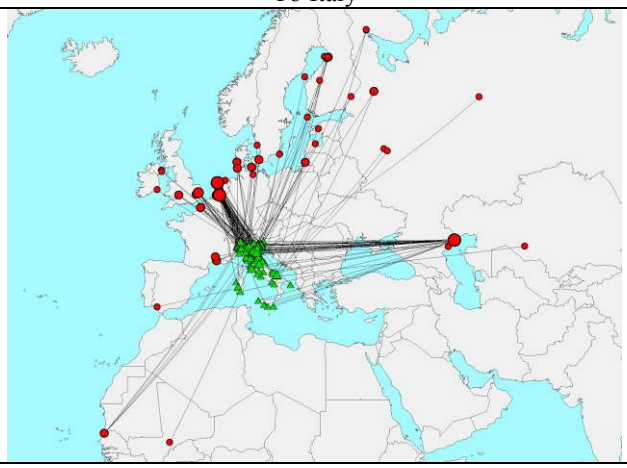
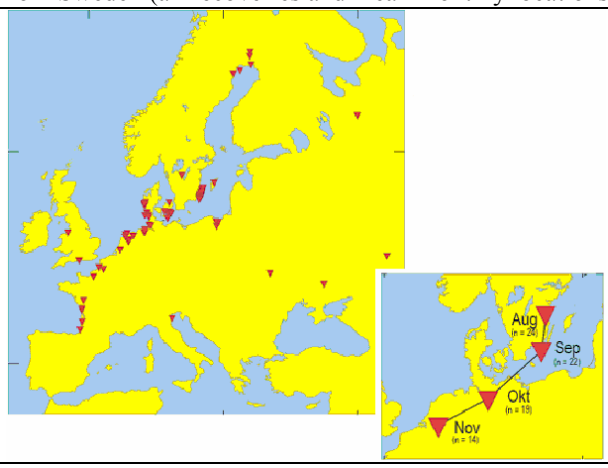
To and from Finland



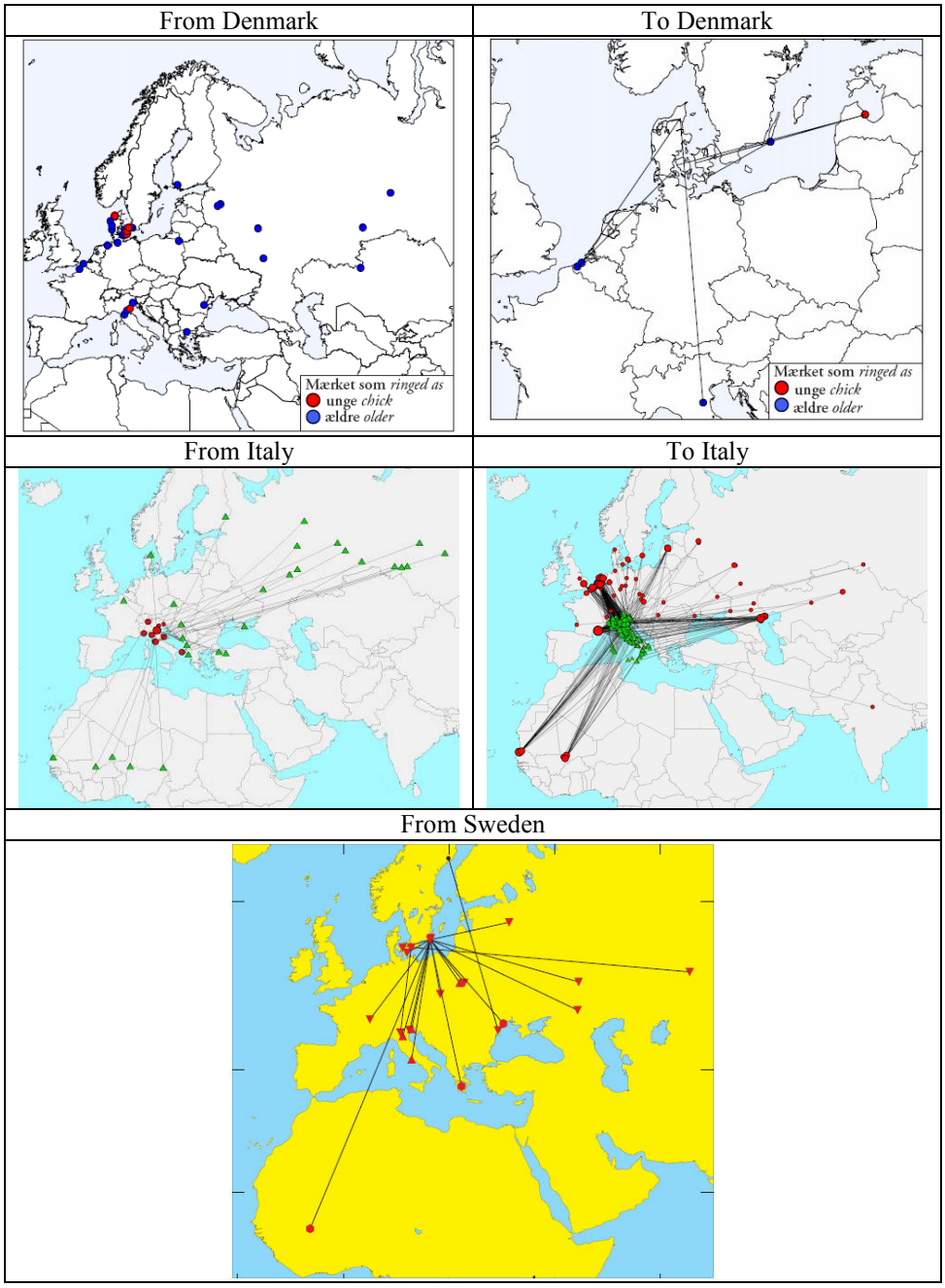
From Italy	To Italy
	
To and from Norway	
	
From Sweden (mean monthly locations)	To Sweden (mean monthly locations)
	

Northern Pintail

To and from Britain & Ireland (in July and August)	To and from Britain and Ireland (in September and October)
	
From Denmark (mean monthly locations)	To Denmark
	
To and from Finland	
	

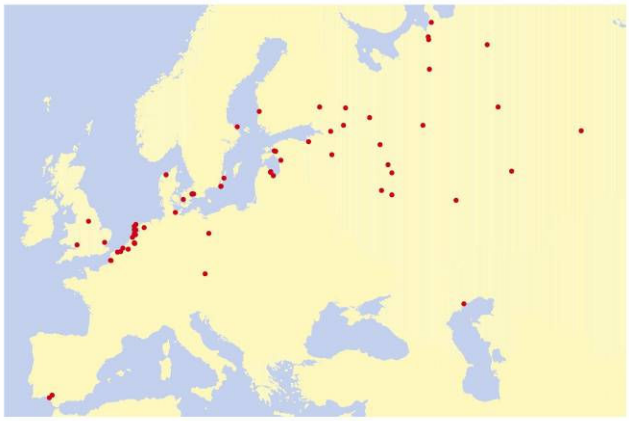
To Italy

From Sweden (all recoveries and mean monthly locations)


Garganey

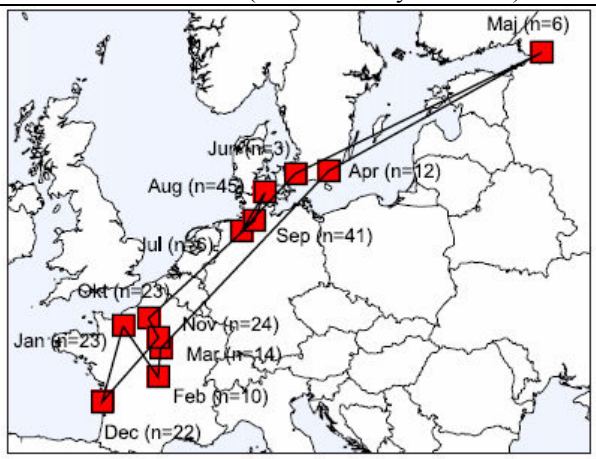

From Denmark
Mærket som ringed as
unge chick
ældre older
To Denmark
Mærket som ringed as
unge chick
ældre older
From Italy
To Italy
From Sweden

Northern Shoveler

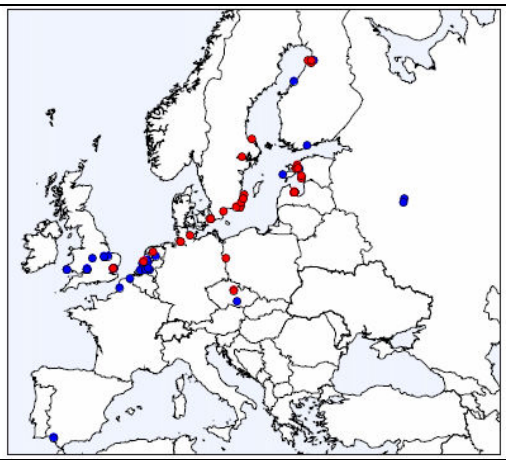
To and from Britain & Ireland (locations in breeding season)



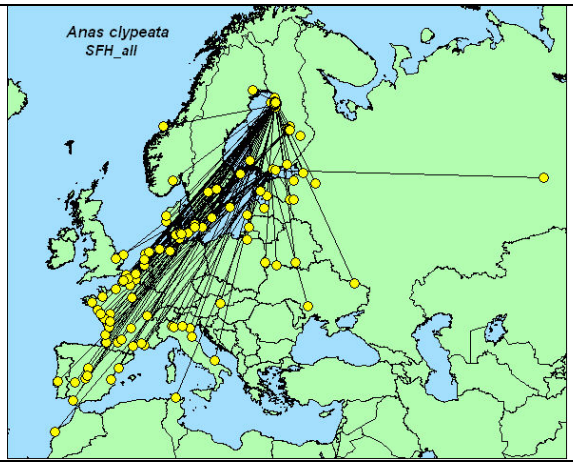
From Denmark (mean monthly locations)

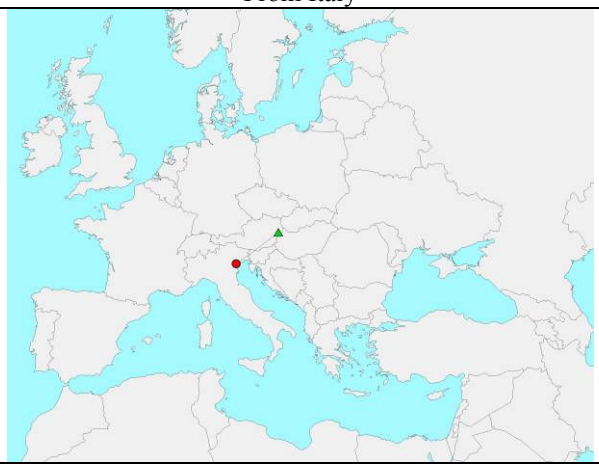
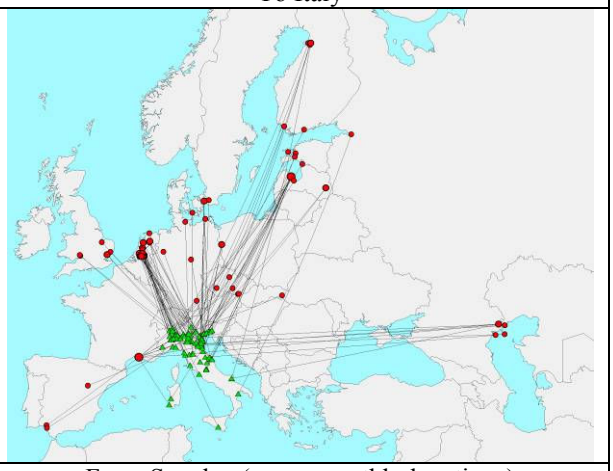
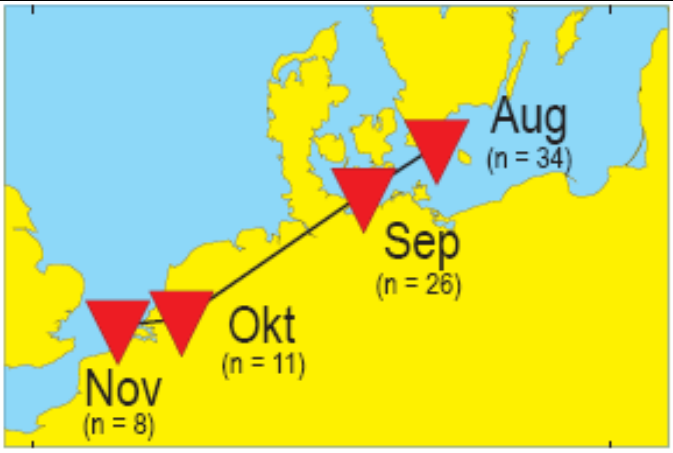
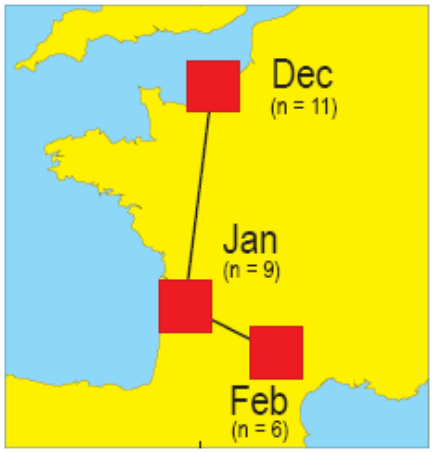


To Denmark



To and from Finland



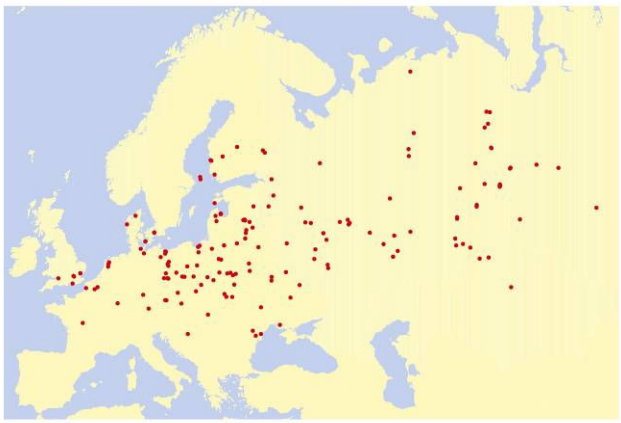
From Italy	To Italy
	
From Sweden (mean monthly locations)	From Sweden (mean monthly locations)
	

Red-crested Pochard

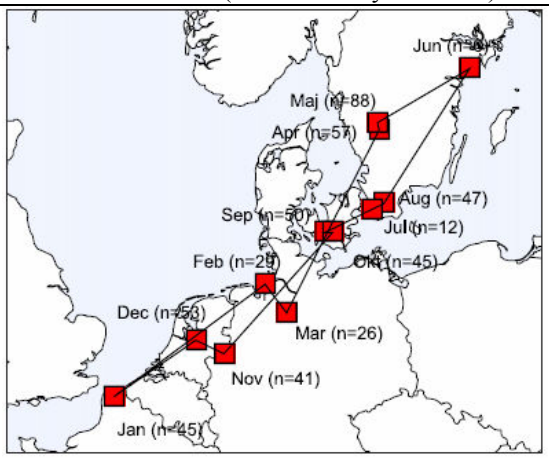
From Sweden

Common Pochard

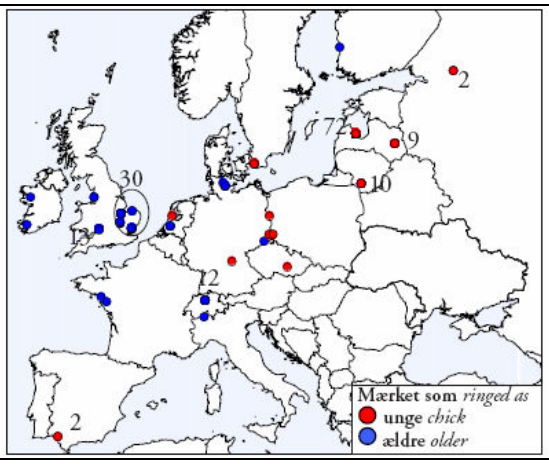
To and from Britain & Ireland (locations in breeding season)



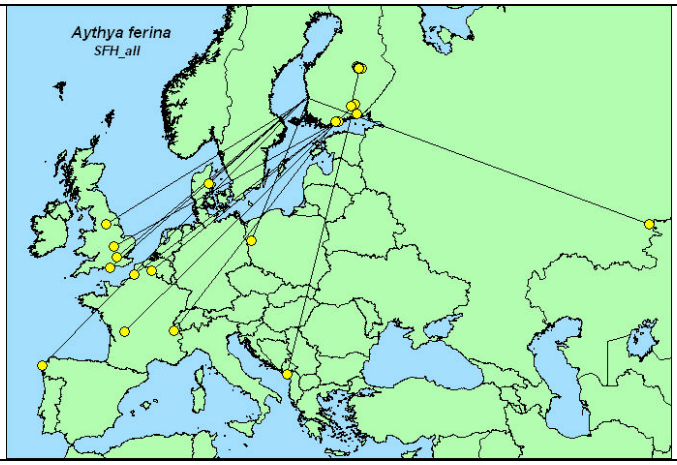
From Denmark (mean monthly locations)

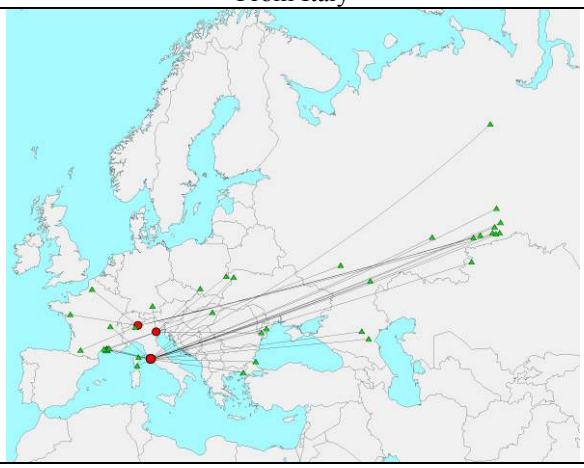
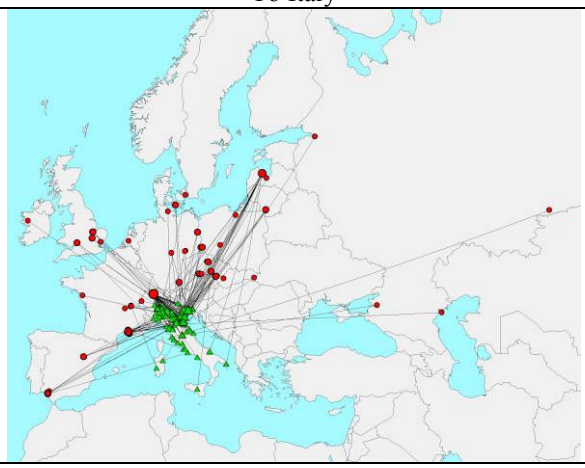
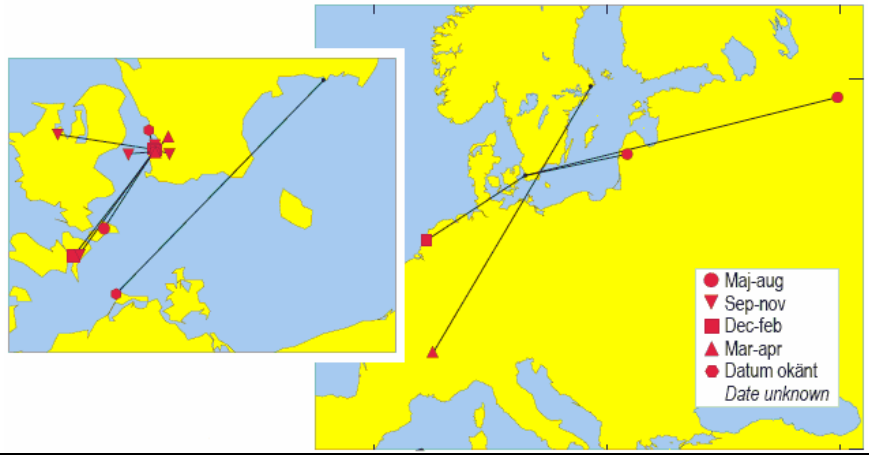


To Denmark



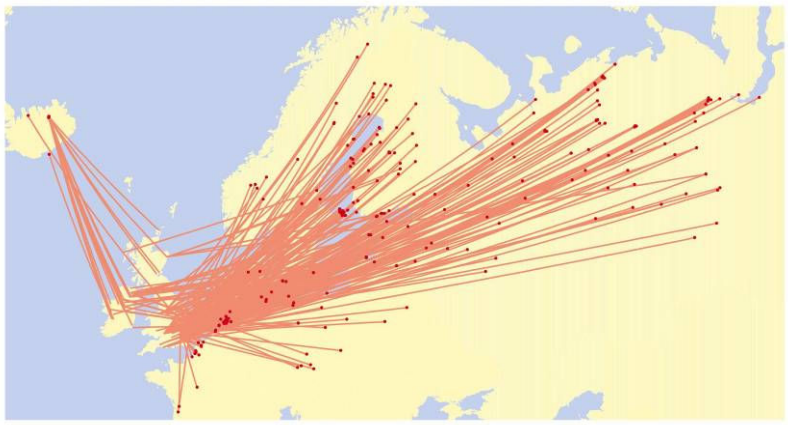
To and from Finland



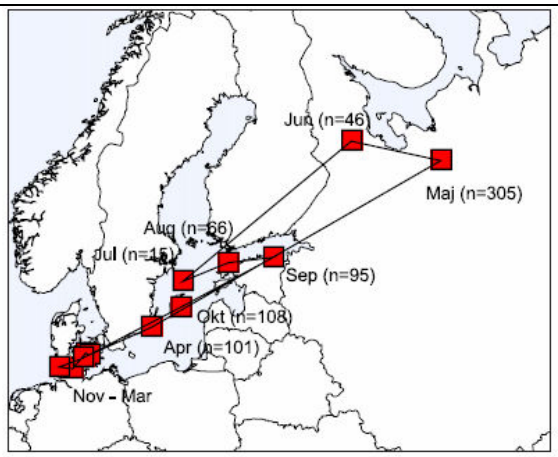
From Italy	To Italy
	
From Sweden	
	

Tufted Duck

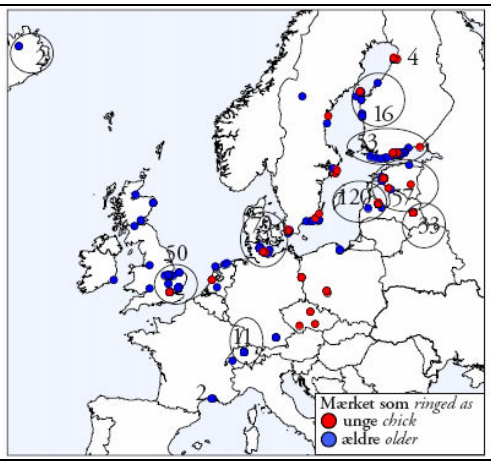
To and from Britain & Ireland (locations in breeding season)



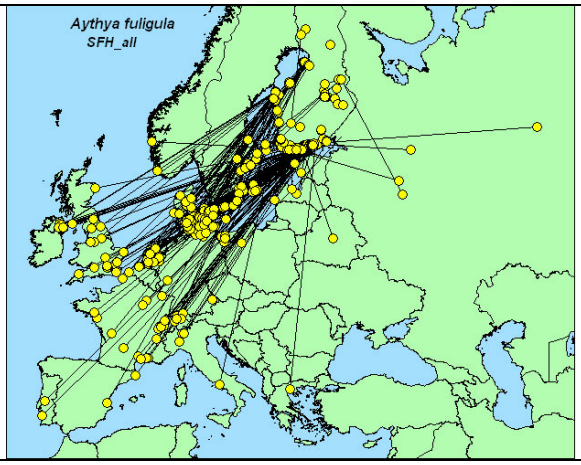
From Denmark

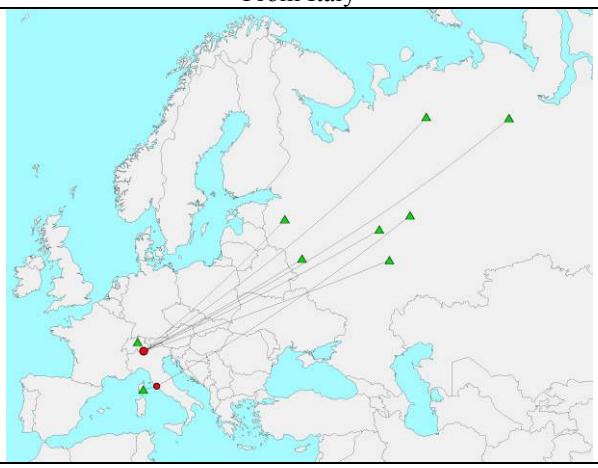
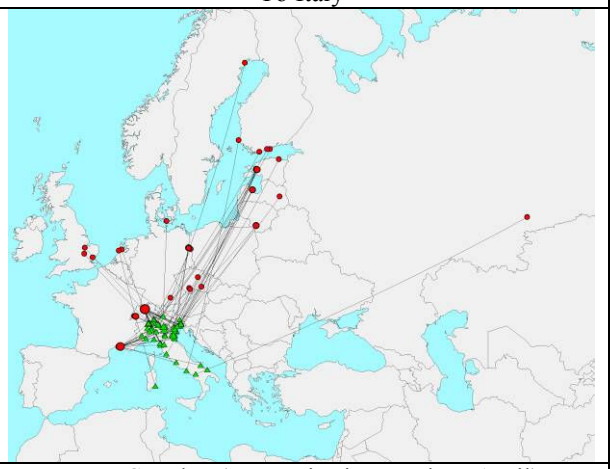
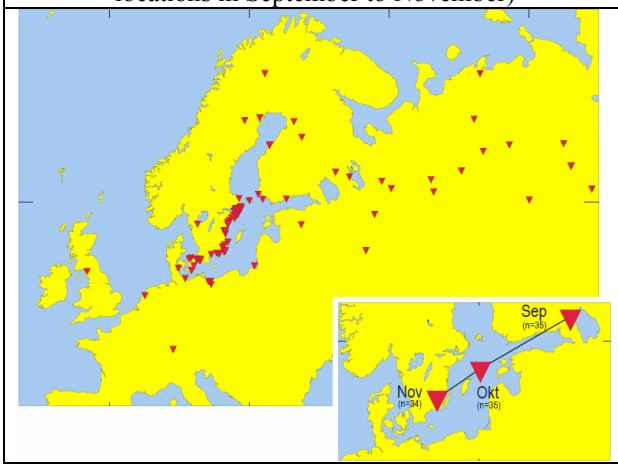
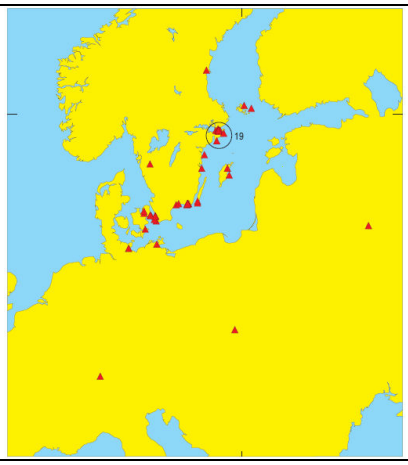


To Denmark

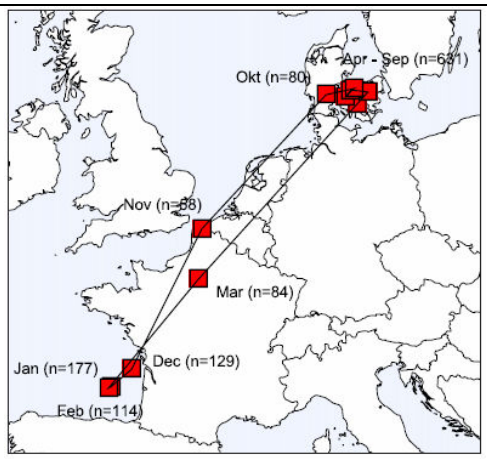
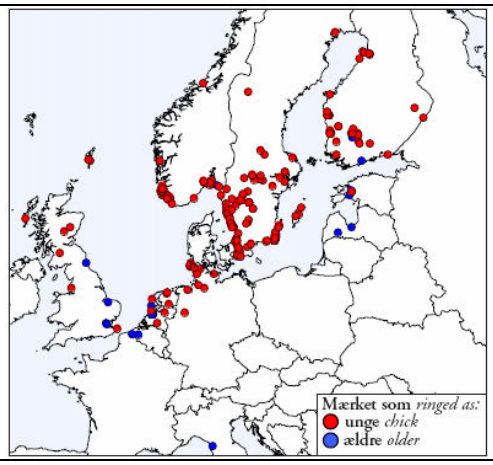
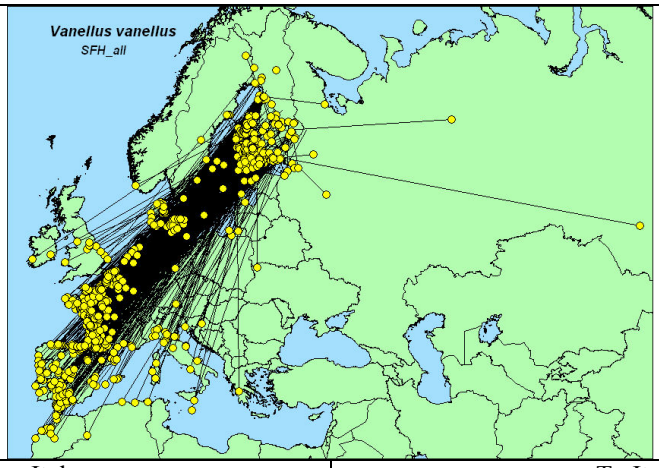
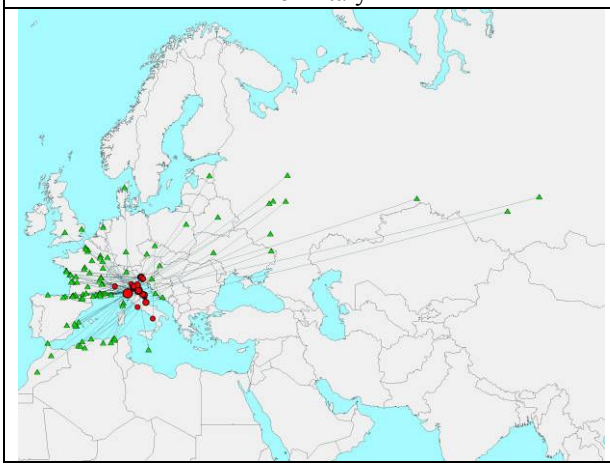
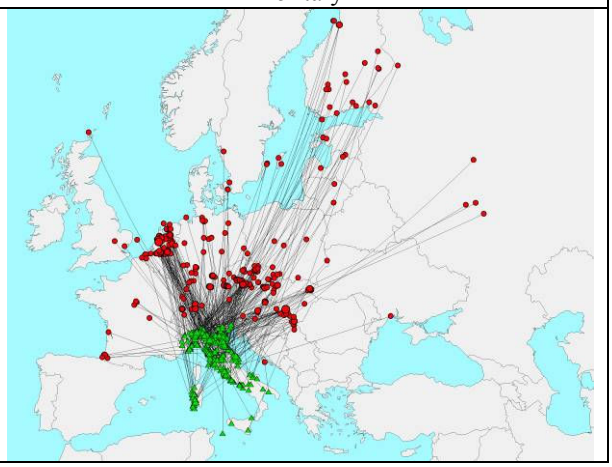


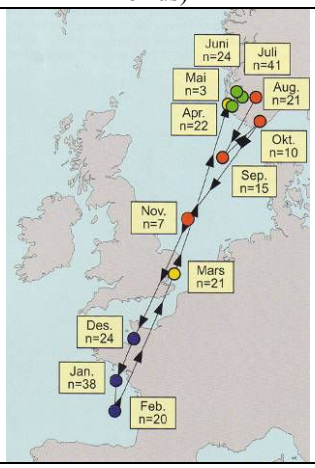
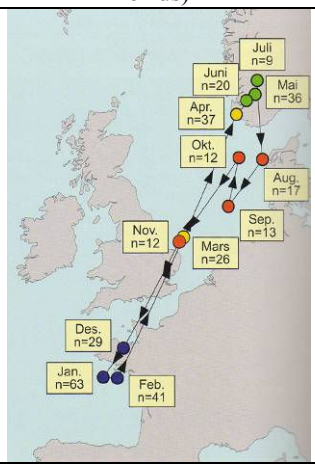
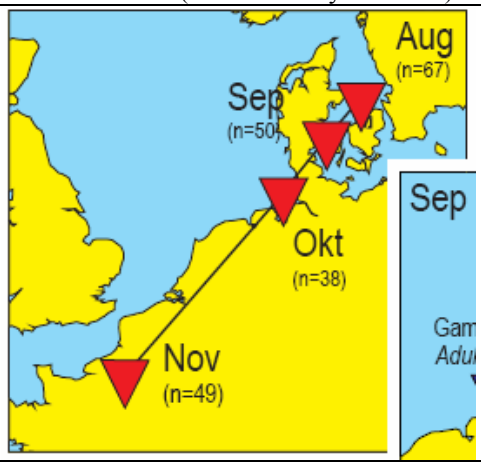
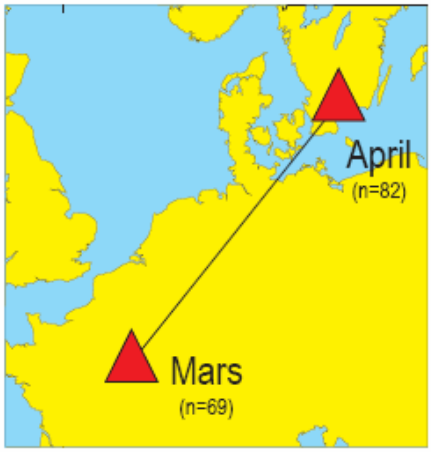
To and from Finland



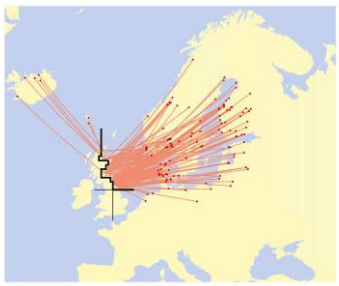
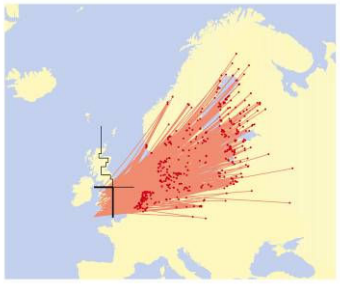
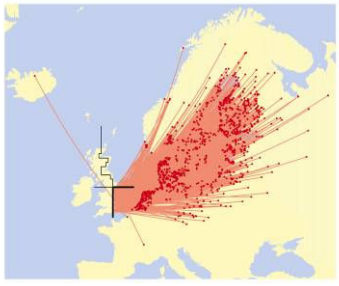
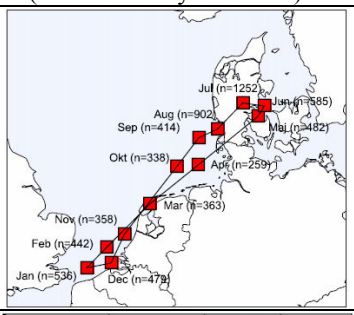
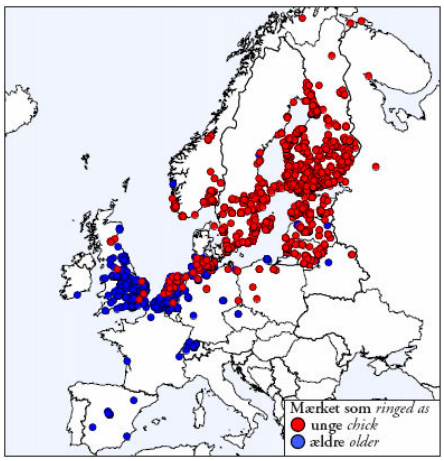
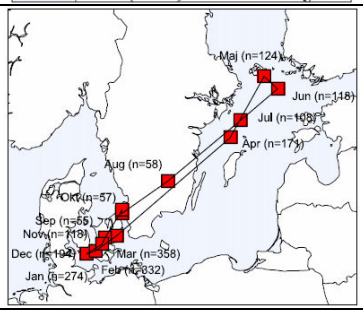
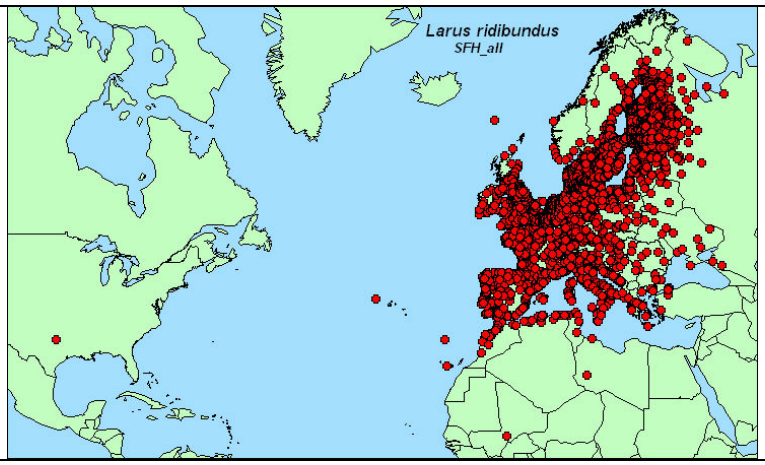
From Italy	To Italy
	
From Sweden (all recoveries and mean monthly locations in September to November)	From Sweden (recoveries in March to April)
	

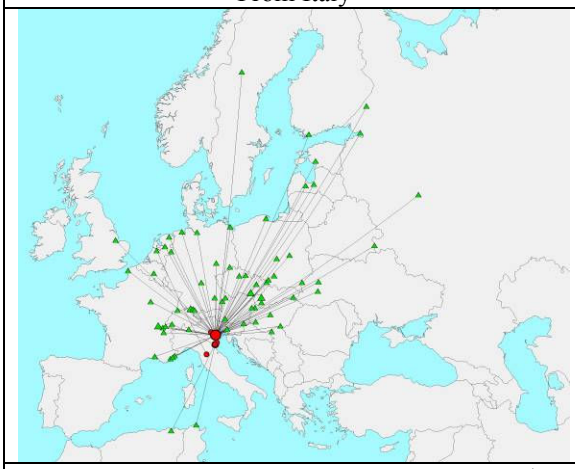
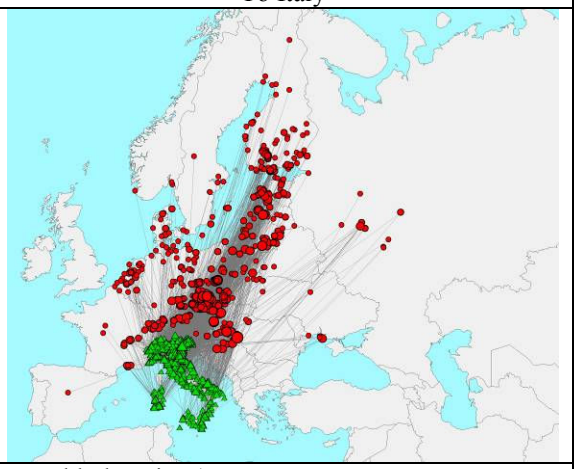
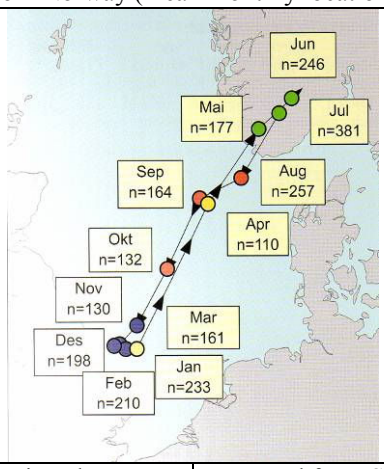
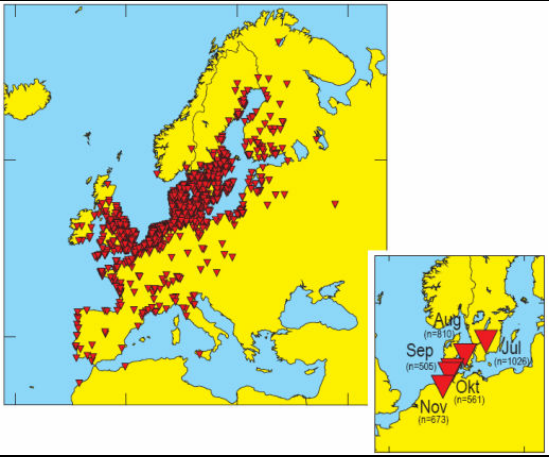
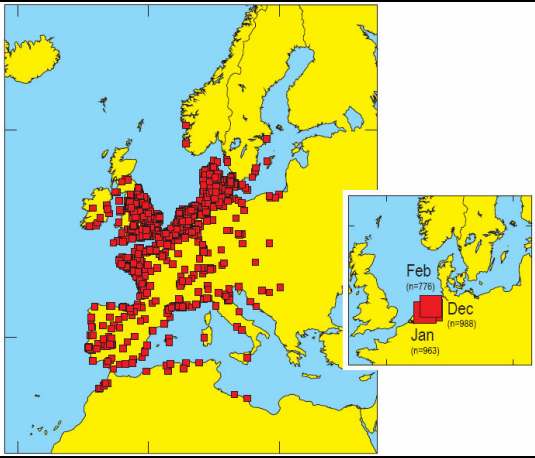
Northern Lapwing

<table>
<tr><td>From Denmark</td><td>To Denmark</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td colspan="2">To and from Finland</td></tr>
<tr><td colspan="2"> 
</td></tr>
<tr><td>From Italy</td><td>To Italy</td></tr>
<tr><td>  </td><td>  </td></tr>
</table>

From Norway (mean monthly locations of first year birds)	From Norway (mean monthly locations of adult birds)
	
From Sweden (mean monthly locations)	From Sweden (mean monthly locations)
	

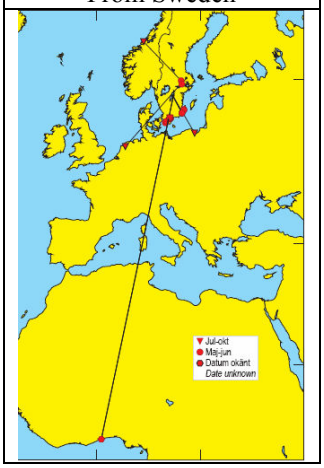
Black-headed Gull

<table>
<tr><td colspan="4">To and from Britain & Ireland (locations in breeding season)</td></tr>
<tr><td>Present in winter in the northwest Britain & Ireland</td><td>  </td><td>Present in winter in the northeast Britain & Ireland</td><td>  </td></tr>
<tr><td>Present in winter in the southwest Britain & Ireland</td><td>  </td><td>Present in winter in the southeast Britain & Ireland</td><td>  </td></tr>
<tr><td colspan="2">From Denmark (mean monthly locations)</td><td colspan="2">To Denmark</td></tr>
<tr><td>Ringed in breeding season</td><td> 
</td><td rowspan="2"> 
</td></tr>
<tr><td>Ringed in November to March</td><td> 
</td></tr>
<tr><td colspan="4">To and from Finland</td></tr>
<tr><td colspan="4"> 
</td></tr>
</table>

From Italy	To Italy
	
From Norway (mean monthly locations)	
	
To and from Sweden (locations in July to November)	To and from Sweden (locations in December to February)
	

Black Tern

From Sweden



Annex 3.1
Site Assessment Format

Rapid assessment format for wetland sites facing an outbreak of Highly Pathogenic Avian Influenza H5N1

1. General information

Name of site:
Country:
Coordinates:
Size: (give size in ha)
Managing organization: (mention organization with full address details)

2. Short description of the site (refer to map)

Topography
Brieftly describe topographical features, including human habitation, main access to site, etc. Refer to map. Describe wetland type in general terms (river system, lake, marshes, coastal/tidal/marine area,etc.)

Habitat types
Describe main habitat types referring to map.

Water depth, water temperature and hydrology
Describe water depth, temperature (mean in ^{0}C, for summer and winter), salinity and relevant hydrological factors.

3. Occurrence of vulnerable bird species in site (summarize information and refer to annexes)

Numbers and seasonal presence of higher risk species (list of EU Commission of xxxxxxx)
Summarize numbers and seasonal presence of higher risk species. If data are available, give mean, range and maximum numbers, otherwise list census results. Details can be provided in an annex. (A full list of higher risk species as adopted by the European Commission on xxxx is available on the European Commission website.)

Presence of other waterbird species which occur in large numbers
Summarize data (numbers and seasonal presence) of other waterbird species which occur in large numbers in the site and which might play a role in the spread of H5N1, because they are abundantly present and/or because they often mix with other species.

Occurrence of bird species identified as posing a special "contact risk with poultry"
Summarize data (numbers and seasonal presence) of bird species with a presumed high risk of coming in contact with poultry and which may form a "bridge" between infected waterbirds and domestic animals. Examples of such birds are Carrion Crow, Black-headed Gull and Starling. A list of species with a high "contact risk with poultry" as identified for the European Union is given as annex 2 to this format. However, the focus should be on the situation in or near the site, which may result in a list with species other than those mentioned in the annex.

Occurrence species of high conservation concern
Mention any species of high conservation concern (red list species) occurring in the site in significant numbers, which might be victim of an Avian Influenza outbreak.

4. Places with high concentrations of vulnerable bird species (refer to map)

Describe the occurrence of breeding colonies, places with large concentrations of foraging birds, night roosts, high tide roosts, etc. Indicate places with significant concentrations on a map.

5. Local movements of vulnerable bird species (refer to map)

Describe local movements of higher risk species and other vulnerable waterbird species as far as relevant for the spread of Avian Influenza on a local/regional scale and within a time frame of days or weeks. Indicate directions of movements of map, together with places of concentration (see above).

6. Position of site in flyway and consequences of bird movements for further spread of H5N1

General position in flyway
Describe general position of site in flyway (if relevant) with major directions of movements during spring and autumn migration. If relevant, mention species which perform “frost migration”.

Consequences of bird movements for further spread of H5N1
Describe consequences of major bird movements for the further spread of H5N1 at the species level. Pay special attention to the higher risk species. Are there any sites where the birds are likely to go after having left your area? Are ringing records available?

7. Human use of site and disturbance effects

Access to the public
Is site open or closed to the public (kind of arrangements)?

Hunting regimes
Describe hunting (intensity, species hunted, etc.)

Other human usage of site (agricultural, fishing, reed cutting, etc.)
Describe other ways in which the site is used by humans (where, intensity, periods).

8. Existence of poultry farms within a radius of 10 km of site

Density, location and nature of poultry farms (chcken, ducks, turkey)
Describe the occurrence of poultry farms inside and in the vicinity of the site. Also pay attention to small scale privately kept poultry. What poultry keeping systems are practised? Is poultry kept indoor, is it free roaming, may it easily come in contact with waterbirds, is there any feeding of poultry outside? If possible, indicate poultry concentrations on map.

Presence of other domesticated animals vulnerable for H5N1 (cats, pigs)
Describe the occurrence of other domesticated animals in or near site which are vulnerable for H5N1. Can any of these species roam freely in the site (contact risk with waterbirds)?

9. Measures to be considered in case of an outbreak of H5N1(refer to national and EU guidelines)

Monitoring bird mortality
Describe how monitoring of dead and moribund birds should be carried out (where, when, focus on particular species?). Try to minimize disturbance of birds in an outbreak area.

Sampling wild birds for the occurrence of AI
Are there any special opportunities for sampling apperantly healthy wild birds without causing disturbance (when, where, which species?)

Restrictions with respect to human activities in and near site
Restrictions to be considered are: closing (parts of) the site for the public, ban on hunting, restrictions with respect to keeping and transport of poultry. With respect to the latter, refer to national/EU guidelines.

10. data sources

Mention data sources used as well as data sources which are available for more detailed information.

Figures and Annexes