



Overview of monitoring work on numbers, reproduction and survival of waterbird populations important in the Wadden Sea and the East Atlantic Flyway

Marc van Roomen, Hans Schekkerman, Simon Delany, Erik van Winden, Stephan Flink, Tom Langendoen & Szabolcs Nagy



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Colofon

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1. Introduction

The Wadden Sea is used as a staging, moulting and wintering area by more than 10 million waterbirds on their way from their breeding grounds in Russia, Canada and Scandinavia to their wintering areas in Europe and Africa. Within the African-Eurasian migration system, the combination of breeding, staging and wintering areas most important for populations also occurring in the Wadden Sea is known as the East Atlantic Flyway (Figure 1). Within flyways, migratory waterbirds are completely dependent on critical networks of sites and habitats. For effective conservation and management of migratory waterbirds using the Wadden Sea, increased international cooperation along the whole flyway is essential.

On June 26, 2009 the World Heritage Committee (WHC) inscribed the Wadden Sea on the World Heritage List. The WHC requested on that occasion the States Parties of Germany and the Netherlands to strengthen their cooperation on management and research activities with States Parties on the African-Eurasian Flyways.

Taking the above into account, a joint meeting of AEWA, BMU, EL&I and CWSS in Bonn on September 28, 2010 decided that an international workshop should be organised fulfilling the aims and needs resulting from the request for international cooperation benefiting 'Wadden Sea' populations along the flyway. This workshop took place on 22-23 March 2011 in Wilhelmshaven, Germany. The aims of this workshop were, among others:

- To identify priority species, sites and countries for international cooperation in relation to the conservation and management of Wadden Sea migratory waterbird species within the flyway;
- To identify data needs for the assessment of status and trends of migratory bird populations at flyway level, in the context of current and future conservation management;
- To identify on-going data collection activities, including current gaps, and identify and assess the need and conditions for additional data collection and/or coordination to enable proper assessment of status and trends of waterbird populations important in the Wadden Sea context.

This document has been prepared to support these aims. It focuses on answering the following questions:

1. Which flyway populations are important in the Wadden Sea context?
2. Which countries are important for these flyway populations?
3. Which sites are important for these populations?
4. How well are these sites covered during the International Waterbird Census?
5. Which populations are covered by studies focussing on reproduction and/or survival?

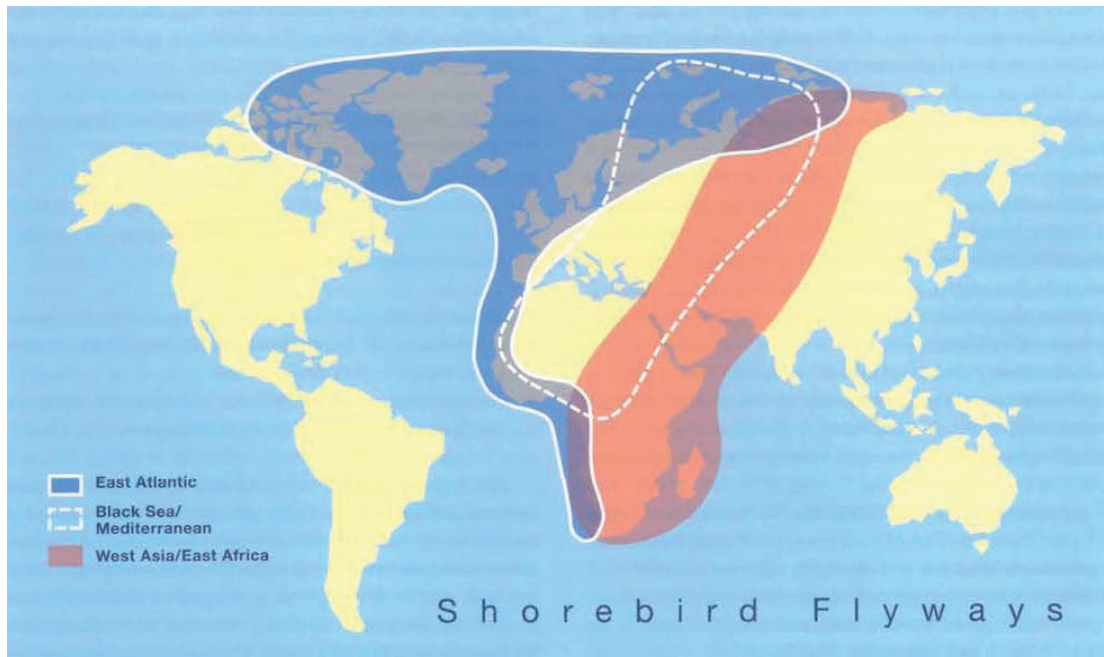


Figure 1. Flyways of waders (shorebirds) in the African-Eurasian region with the East Atlantic Flyway in blue. Species specific flyways can deviate from this generalised delineation. (Source: Rodney West and International Wader Study Group).

2. Which species and populations are important?

2.1 Introduction

The aim of this chapter is to identify which species and populations of waterbirds within the East Atlantic Flyway are important in the Trilateral Wadden Sea context.

2.2 Material and methods

The analyses were undertaken as follows:

- The definitions of species and populations of waterbirds were those used by Wetlands International in the context of *Waterbird Population Estimates – fourth edition* (Wetlands International 2006) (WPE 4) and defined by the Ramsar Convention on wetlands.
- The definitions of flyway/biogeographical populations were those used in the Wings over Wetlands (WOW) project and depicted in the Critical Site Network (CSN) tool: <http://csntool.wingsoverwetlands.org/csn/default.html>
- First, a list of species and populations occurring in the East Atlantic Flyway was prepared (Annex A).
- Secondly, flyway populations for which the Wadden Sea (cooperation) Area (see figure 2) holds 1% or more of the total population were selected. This was based on Laursen *et al.* 2011, JMMB unpublished, JMBB unpublished, Wahl *et al.* in prep, SOVON unpublished, NERI unpublished.
- Thirdly, only populations substantially depending on food sources found on tidal flats, saltmarshes, beaches, sublittoral or marine habitats within the Cooperation Area were considered as important within this study.

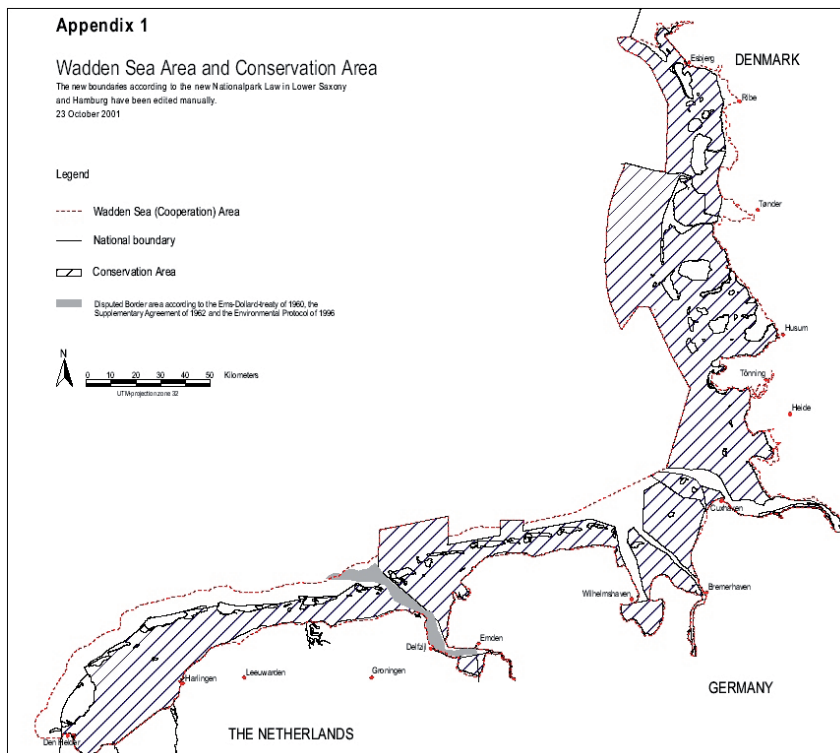


Figure 2. The Wadden Sea (cooperation) area (red line) and the conservation area (hatched blue), www.Waddensea-secretariat.org

2.3 Results

Table 1 lists the species and populations which occur in internationally important numbers (indicated by the regular occurrence of 1% or more of their flyway populations) within the Cooperation Area of the Wadden Sea and depending heavily on food resources there. Table 2 lists species and populations also occurring in internationally important numbers, but depending less on the typical Wadden Sea ecosystems.

Table 1. Waterbird species and populations, which occur in internationally important numbers and which are ecologically dependent on food resources within the Wadden Sea Area (figure 2). The average maximum number occurring in 1999/00 – 2006/07 (based on Karsten *et al.* 2011, Wahl *et al.* in prep., JMMB unpublished, JMMB unpublished, SOVON unpublished, NERI unpublished) and the percentage of the total flyway population are given. Sizes of flyway populations based on Wetlands International 2006.

SPECIES	POPULATION	MAX.NR	% of FLY.POP
Red-throated Diver	NW Europe (non-bre)	5000	2
Great Cormorant	sinensis, N, C Europe	25200	6
Eurasian Spoonbill	leucorodia, E Atlantic	1800	16
Greylag Goose	anser, NW Europe (bre)	35500	7
Barnacle Goose	N Russia, E Baltic (bre)	353000	84
Brent Goose	bernicla	200000	100
Brent Goose	hrota, Svalbard, N Greenland (bre)	900	13
Common Shelduck	NW Europe (bre)	246000	82
Eurasian Wigeon	NW Europe (non-bre)	332000	22
Common Teal	crecca, NW Europe (non-bre)	43100	9
Mallard	platyrhynchos, NW Europe (non-bre)	156000	3
Northern Pintail	NW Europe (non-bre)	31700	53
Northern Shoveler	NW & C Europe (non-bre)	8100	20
Greater Scaup	marila, W Europe (non-bre)	28700	9
Common Eider	mollissima, Baltic, Wadden Sea	249000	33
Common Scoter	nigra	305000	19
Red-breasted Merganser	NW & C Europe (non-bre)	560	0 ¹
Eurasian Oystercatcher	ostralegus	507000	50
Pied Avocet	W Europe (bre)	39000	53
Common Ringed Plover	hiaticula	5400	7
Common Ringed Plover	psammmodroma/tundrae	34300	18
Kentish Plover	alexandrinus, E Atlantic, W Mediterranean	700	1
Eurasian Golden Plover	apricaria	?	2
Eurasian Golden Plover	altifrons, N Europe, extreme W Siberia (bre)	127000	17
Grey Plover	squatarola, E Atlantic (non-bre)	149000	60
Red Knot	canutus	358000	105
Red Knot	islandica	341000	76
Sanderling	E Atlantic (non-bre)	36800	31
Curlew Sandpiper	W Africa (non-bre)	13500	1
Dunlin	alpina	1154000	87
Dunlin	schinzii, Baltic (bre)	?	2
Bar-tailed Godwit	taymyrensis, W, SW Africa (non-bre)	329000	55
Bar-tailed Godwit	lapponica	161000	134
Whimbrel	phaeopus, NE Europe (bre)	3900	1
Eurasian Curlew	arquata	324000	38
Spotted Redshank	Europe (bre)	20500	23

Table 1. Continued.

SPECIES	POPULATION	MAX.NR	% of FLY.POP
Common Redshank	totanus Northern Europe (breeding)	84400	34
Common Redshank	robusta	43800	16
Common Greenshank	NW Europe (bre)	26000	11
Ruddy Turnstone	interpres, NE Canada, Greenland (bre)	8300	6
Ruddy Turnstone	interpres, Fennoscandia, NW Russia (bre)	8500	10
Little Gull	N, C & E Europe (bre)	5400	4
Black-headed Gull	West & Central Europe (bre)	461000	11
Common Gull	canus	225000	10
Lesser Black-backed Gull	intermedius	268000	71
Herring Gull	argentatus/argenteus	194000	7
Great Black-backed Gull	NE Atlantic	12300	3
Sandwich Tern	sandvicensis, W Europe (bre)	59600	35
Common Tern	hirundo, S, W Europe (bre)	23000	12
Common Tern	hirundo, N, E Europe (bre)	?	2
Arctic Tern	N Eurasia (bre)	18000	2
Little Tern	albifrons, W Europe (bre)	1700	3

1) Numbers during the counts are probably underestimated (on open water), probably well present in internationally significant numbers.

2) Population is present in the Wadden Sea, but cannot be distinguished/separated from other present populations of the same species, probably present in internationally significant numbers.

Table 2 Waterbird species and populations which occur in internationally important numbers and are not ecologically dependent on food resources within the Cooperation Area of the Wadden Sea. Sources same as Table 1.

SPECIES	POPULATION	MAX.NR	% of FLY.POP
Tundra Swan	bewickii, NW Europe (non-bre)	690	3
Bean Goose	rossicus	5500	1
Pink-footed Goose	Svalbard (bre)	4900	12
Greater White-fronted Goose	albifrons, Baltic - North Sea	7400	1
Gadwall	strepera, NW Europe (bre)	980	2
Northern Lapwing	Europe (bre)	117000	2
Black-tailed Godwit	limosa, W Europe (bre)	2000	1
Black-tailed Godwit	islandica	800	2
Black Tern	niger	11500	2

3. Which countries are important?

3.1 Introduction

The aim of this chapter is to identify which countries are important for flyway populations of waterbirds, which are important within the Wadden Sea context. In this study this is narrowed down to identifying the countries where these populations are breeding and wintering.

3.2 Material and methods

The analyses were undertaken as follows:

- Breeding countries for the populations for which the Wadden Sea was identified as being internationally important were selected on the basis of the flyway delineations and breeding ranges depicted in the CSN Tool, the Anatidae Atlas (Scott & Rose 1996) and the Wader Atlas (Delany *et al.* 2009). This was supplemented with information from the Birds in Europe 2 project (Birdlife International 2004).
- The importance of the breeding populations within the countries identified were based on estimates of breeding numbers per country presented in Birdlife International (2004) and on expert judgement.
- For the sake of simplicity, all estimates of breeding pairs were translated to individual birds by multiplying by 3 (2 adults and average of one young, as recommended by Meininger *et al.* 1995) and compared with the population estimates as published in Wetlands International (2006).
- Wintering countries were also based on the flyway delineations as used for the breeding countries. Wintering countries and their importance were identified on the basis of information within the IWC database and the CSN Tool. For both these sources, we only used, the information from the wintering period, and duplication in information from the same site from both sources was avoided. For each country the maximum wintering number per site since 1990 was calculated and added to produce country 'totals'. This crude method was used to take into account countries with only few counts or lacking recent data.
- These estimates of wintering numbers were also translated to percentages of their flyway populations per country.
- Both for the breeding countries and wintering countries, the crude estimates of importance (in relation to their flyway population size), were transferred to classes: less than 0,5 %, 0,5-5% and more than 5% (see appendix B).

3.3 Results

In Table 3 the countries are listed and ranked in order of the number of populations (the populations of Table 1) for which they are important (threshold used 0,5% or more of the population size) as breeding or wintering countries.

Table 3. Number of important wintering and breeding populations per country for populations important in the Wadden Sea context.

Country	breeding	Country	wintering
Sweden	36	France	36
Russia	34	Netherlands	33
Norway	32	Germany	32
Finland	27	United Kingdom	31
Germany	24	Denmark	29
Netherlands	23	Ireland	26
Denmark	22	Spain	26
Estonia	21	Belgium	22
United Kingdom	21	Mauritania	22
France	15	Portugal	19
Belgium	14	Morocco	18
Iceland	14	Senegal	14
Ireland	13	Gambia	13
Poland	9	Guinea-Bissau	13
Latvia	8	Sweden	12
Greenland	7	Tunisia	12
Lithuania	7	Guinea	10
Spain	7	Italy	10
Portugal	5	Ghana	9
Canada	4	Sierra Leone	9
Svalbard	4	South Africa	7
Italy	2	Algeria	6
Algeria	1	Namibia	6
Austria	1	Norway	6
Hungary	1	Latvia	5
Mauritania	1	Poland	5
Morocco	1	Switzerland	4
Senegal	1	Austria	3
Tunisia	1	Estonia	3
Benin	0	Czech Republic	2
Czech Republic	0	Finland	2
Gambia	0	Greece	2
Ghana	0	Lithuania	2
Greece	0	Benin	1
Guinea	0	Iceland	1
Guinea-Bissau	0	Mali	1
Mali	0	Niger	1
Namibia	0	Russia	1
Niger	0	Slovakia	1
Sierra Leone	0	Togo	1
Slovakia	0	Canada	0
South Africa	0	Greenland	0
Switzerland	0	Hungary	0
Togo	0	Svalbard	0

4. Monitoring of population size and population trend

4.1 Introduction

When priority-setting and planning the conservation of any species it is important, if possible to be able to estimate the number of individuals in the population (population size), and whether that number is stable, decreasing or increasing (population trend). Further information on rates of change in numbers is also valuable, and this requires regular and detailed survey work over long time periods.

4.1.1 How numbers and trends are estimated

The aim of this chapter is to assess the current state of the monitoring of population sizes and trends of populations whose flyways include the Wadden Sea. In order to effectively monitor numbers and population trends of waterbirds, it is necessary to undertake counts in a standardised way at least once per year. To ensure that changes in counts properly reflect changes in numbers of the population being monitored, a sample of sites (or other standardised units) needs to be used that hold a representative sample of the population. If the same, representative, sites were counted in the same way every year, simple comparison of counts from year to year would be a valid method of estimating population trends. In reality, some sites are not counted every year, and others may only be partially counted for a variety of reasons. If these variations in coverage from year to year are not too great, it is possible to estimate population trends using a variety of statistical methods (e.g. <http://www.cbs.nl/en-GB/menu/themas/natuur-milieu/methoden/trim/default.htm>).

Estimating waterbird numbers is an important part of the process of formulating conservation policy for waterbirds. For example, One of the criteria used to classify the conservation status of waterbirds under AEWA is the number of individuals in the population (http://www.unep-aewa.org/documents/agreement_text/eng/pdf/aewa_agreement_text_2009_2012_table1.pdf), and the 1% thresholds used by Ramsar, The European Commission and others to identify internationally important sites can only be calculated if reliable population estimates exist (Wetlands International 2006).

Estimating the numbers of individuals in each population is challenging and almost invariably involves an element of expert opinion. Some populations of geese and swans are very conspicuous and a high proportion of their populations congregate in places where they are accessible for counting. For these populations, counted totals and actual population size may be very close (e.g. Madsen *et al.* 1999). Such populations are exceptional, however, and for each population, count data form the basis of estimates which are calculated by taking the count totals and adding the estimated total of birds which are missed by counts because they occurs at sites which are not accessible to observers, or because they use habitats which are not readily counted. Some species with very dispersed and skulking behaviour, such as Rallids and Snipes, cannot be effectively monitored and remain very poorly known (e.g. Kalchreuter 2003).

4.1.2 Scale and timing of monitoring

Most waterbirds are highly migratory, and many populations migrate thousands of kilometres between breeding and non-breeding grounds using geographical ranges that span two or more continents. Monitoring at this scale is challenging and there is only one programme, the International Waterbird Census (IWC), which operates at a scale which allows monitoring of

these populations (e.g. Gilissen et al. 2002). A few dispersed populations that are not well covered by IWC are best monitored in the breeding season, and the European Bird Census Council (EBCC) runs a programme, the Pan-European Common Bird Monitoring Scheme (PECBMS), which merges the results of national level common breeding bird surveys to produce European scale population estimates and trends (<http://www.ebcc.info/pecbm.html>). Colonial breeding species are most congregatory during the breeding season and may be better monitored at this time than in January, but there are not yet any internationally coordinated monitoring schemes for these species.

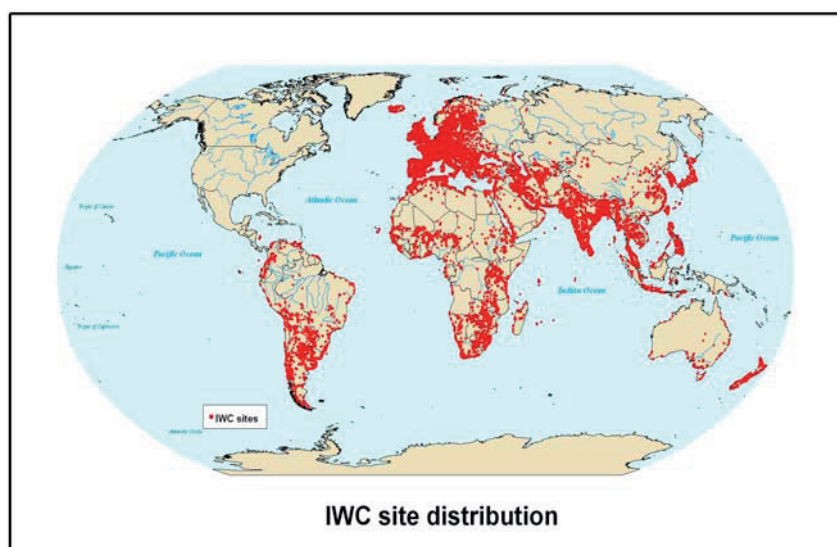
4.2. Material and methods

4.2.1 January counts

The most geographically extensive and longest running international waterbird monitoring programme in the world is the International Waterbird Census (IWC), coordinated by Wetlands International and its predecessor organisations since 1967. Counts for IWC take place in January every year because this is the month when many populations in the northern hemisphere are least migratory, minimising complications arising from counting populations which are moving about. January is also a time when many populations in the northern hemisphere congregate conspicuously at sites where they are readily counted. The IWC relies on a network of about 15,000 expert observers, most of whom are volunteers, to keep track of numbers and population trends of the world's waterbirds. These volunteers mostly participate in national level monitoring schemes and National Coordinators of these schemes submit their data to Wetlands International every year, on a goodwill basis, because of the importance of considering their national populations in the more biologically meaningful context of their entire flyways.

The January IWC counts now take place in most countries in the world (Figure 3), although coverage is most comprehensive in Europe. Blank areas on the map are North America, where monitoring is undertaken professionally by the Federal Agencies, and large areas of the Northern Hemisphere, especially in Russia and China, that are frozen in January and so inaccessible for waterbirds.

Figure 3. The nearly 30,000 sites included in IWC between 1967 and 2007



4.2.2 Monitoring in the breeding and migration seasons

Most waterbird species have a dispersed distribution during the breeding season, and many of these have huge breeding ranges in inaccessible Arctic regions, allowing only very partial and incomplete monitoring for most species in this season (e.g Krivenko 1991). A relatively small number of species are nevertheless best monitored in the breeding season because they are more conspicuous at that time, and so more readily monitored, or because they migrate to sites or habitats where counting is irregular outside the breeding season. The Pan-European Common Bird Monitoring programme of EBCC has taken place in most European countries since 2002 and is an important source of data on population trends of some waterbird species, especially those which are not well covered by IWC. Colonially nesting species such as herons, gulls and terns may be considerably easier to count when congregating at their colonies than when dispersed outside the breeding season, and a number of one-off surveys at national level, and a few national monitoring schemes for these species contribute to estimations of numbers and population trends (Hoffman *et al.* 1996). Monitoring during migration is rarely attempted because of the difficulty of keeping track of populations which may be moving rapidly at international scales. Exceptions are occasionally made for species with very well known migrations that use a small number of sites which can be counted almost simultaneously. In the Wadden Sea context, two species, Brent Goose and Barnacle Goose, fall into this category. Monitoring during the migration seasons is especially important for identifying sites important as staging areas used by waterbirds for refuelling on their arduous migrations and is less suitable for assessing population trends..

4.2.3 Assessment of current state of monitoring of Wadden Sea populations

The analyses that follow are mainly based on IWC data, together with the summarised data brought together in the Critical Site Network Tool web portal. This portal includes the IWC data and data on Important Bird Areas (IBAs) from BirdLife International's World Bird Database, as well as data on flyway boundaries, Ramsar sites and protected areas.

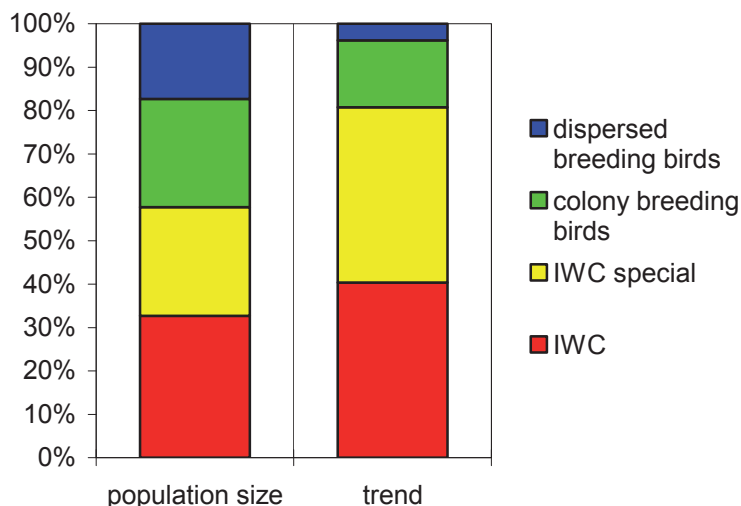
The analyses were undertaken as follows:

- The assessment of the preferred method to monitor population size and trend per population was based on an earlier assessment for all populations in the African-Eurasian region (van Roomen 2010). See Annex C.
- The availability of flyway trends per population was assessed on the basis of current work for the 5th edition of the *Report on the conservation status of waterbirds in the Agreement area* being undertaken on behalf of AEWA (Delany *et al in prep.* 2011) and expert judgement. See Annex C.
- The identification of important sites to be covered during the monitoring of wintering populations important in the Wadden Sea context is based on an analysis of the IWC database and the CSN Tool. Sites, which on average hold one or more populations in internationally important numbers, See Annex D.
- The assessment of the count coverage and regularity at important wintering sites is based on the IWC database.

4.3 Results

4.3.1 Preferred methods for assessing population size and trend for populations important in the Wadden Sea context

Figure 4. Preferred method for assessing population size and trend for populations important in the Wadden Sea context.

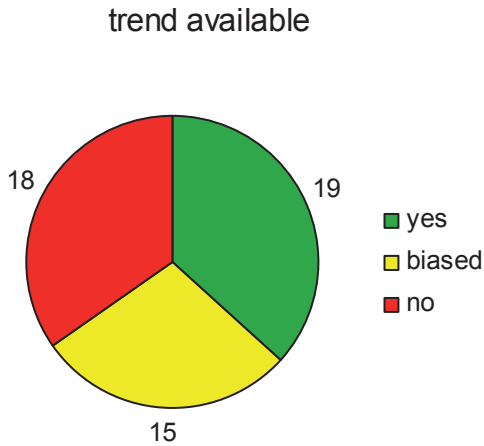


Annex C and Figure 4 suggest that IWC and related winter surveys (IWC Special counts for sea ducks and coastal waders in West Africa) are the most important methods of monitoring both population sizes and trends of Wadden Sea populations. Surveys of colonially breeding species in the breeding season are also important for Great Cormorant, Eurasian Spoonbill and 11 populations of gulls and terns. Surveys during the breeding season are preferable for seven populations of waders with generally dispersed distributions, or for which populations mix extensively in winter. Breeding season surveys are also considered preferable for Red-throated Diver, which mostly winters at sea, and Mallard, which is well represented in breeding bird surveys throughout Europe. All the remaining 29 populations are best assessed by IWC in winter.

4.3.2 Availability of data on numbers and trends

Population estimates have been calculated for all Wadden Sea populations, but population trends require higher quality data collected over a longer period and so are less generally available. Figure 4 shows that IWC is the preferred method of assessing population trends for 80% of those populations for which trend data are available. Figure 5 shows that good quality trends can currently be estimated for just over one third of Wadden Sea populations, while biased trend data are available for just under one third, and no reliable data for another third (Wetlands International unpublished). The biased data are usually for species with extensive winter distributions in Africa where monitoring is less intense and comprehensive, resulting in trends which reflect what is happening in Europe more strongly than what is happening to the overall population.

Figure 5 The availability of flyway trends for waterbird populations which are important in the Wadden Sea context. See Annex C for the details.



4.3.3 Important sites within the East Atlantic flyway for ‘Wadden Sea’ populations

Annex D lists sites on the East Atlantic Flyway that hold internationally important numbers of at least one waterbird species during winter, for populations which are also important in the Wadden Sea context. Table 4 gives the selection of ‘most’ important sites based on the summed international importance and the number of important Wadden Sea populations occurring. Figure 6 summarises the count coverage of important sites in different geographical regions along the flyway where Wadden Sea populations occur. It is clear that sites in North-West Europe are well covered, with January count data being available for 90% of the site-year combinations in 1990-2007. Data availability from sites in Northern Europe and Southern Europe is lower, with January count data being available from 74% of the sites-year combinations in Northern Europe and 69% in Southwest Europe. Data availability from sites in Africa is considerably lower than for European sites. At sites in North Africa that are important for populations that use the Wadden Sea, only 50% of site-year combinations have January count data available. In Western and Southern Africa, this is only 31%.

Figure 6 The current availability of data in the IWC database for different regions for sites important for wintering Wadden Sea populations (average percentage of January counts available in the IWC database for sites in each region between 1990 and 2007).

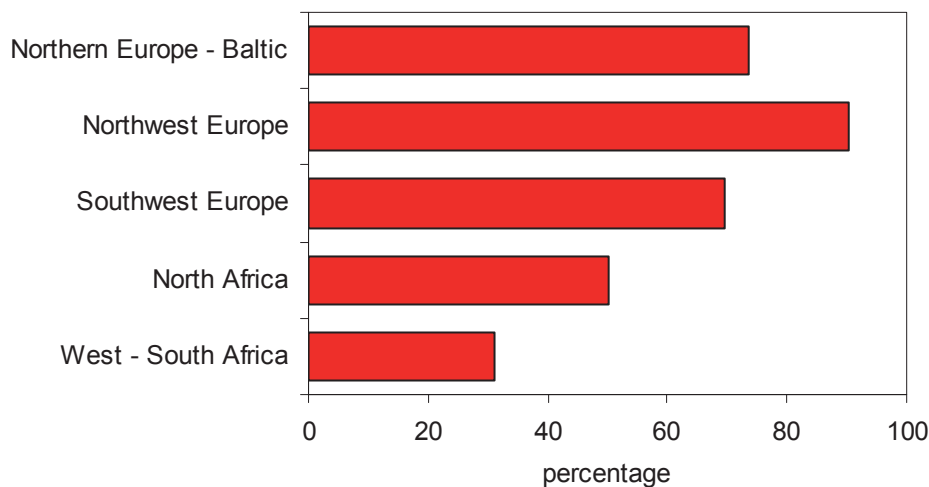


Table 4. Selection of most important sites for 'Wadden Sea' populations in winter. Selection is based on the summed international importance from the different populations (summed importance) and the number of populations (populations). All important sites are in Annex D.

Country	Site	Summed importance	Populations
Mauritania	Banc d'Arguin National Park	516	13
Guinea-Bissau	Arquipélago dos Bijagós	178	10
Netherlands	Dutch Wadden Sea	161	19
Germany	Greifswalder Bodden	64	6
Germany	Schleswig-Holstein Wattenmeer	48	11
Netherlands	Lake IJsselmeer	45	2
Germany	Coast and lagoons of Western Pomerania	44	10
Guinea-Bissau	Rio Tombali, Rio Cumbij and Ilha de Melo	42	7
United Kingdom	Mid-Essex Coast	35	9
Tunisia	Kneiss	35	6
United Kingdom	Humber Estuary	35	7
United Kingdom	Lindisfarne	34	3
United Kingdom	Morecambe Bay	31	9
Ghana	Songor Ramsar Site	30	6
France	Marais Poitevin et Baie de l'Aiguillon	29	10
Denmark	Danish Wadden Sea	28	7
United Kingdom	The Wash	25	5
France	Bassin d'Arcachon et Banc d'Arguin	25	5
Netherlands	Oosterschelde	25	11
Germany	Wismar Bay and Salzhaff	24	5
Mauritania	Aftout es Sâheli	24	5
Ghana	Keta Lagoon Ramsar Site	24	5
United Kingdom	Dee Estuary	23	7
Senegal	Djoudj wetlands	22	2
Morocco	Merja Zerga	21	3
Germany	Niedersachsen Wattenmeer	21	6
Senegal	Delta du Saloum	20	8
Germany	Elbe marshes between Stade and Otterndorf	19	6
France	Lac de Grand-Lieu	18	4
United Kingdom	Ribble and Alt Estuaries	17	7
Ghana	Densu Delta Ramsar Site	16	4
Portugal	Ria Formosa (Faro lagoon)	16	6
Denmark	Eastern German Bight	16	3
Poland	Pomeranian Bay	15	2
Guinea-Bissau	Ilha de Bolama - Rio Grande de Buba	15	7
Spain	Guadalquivir Marshes	15	1
Sierra Leone	Yawri Bay	14	6
United Kingdom	North Norfolk Coast	14	6
Portugal	Tejo Estuary	14	5
Senegal	Guembeul Avifaunal Reserve and St Louis lagoons	14	2
Netherlands	Westerschelde and Saefinghe	14	4
Sweden	Falsterbo-Bay of Foteviken	13	5
France	Baie du Mont Saint Michel et Ile des Landes	13	8
France	Golfe du Morbihan et Etier de Penerf	13	8
United Kingdom	Mersey Estuary	13	4

Table 4. Continued.

Country	Site	Summed importance	Populations
Germany	Eastern part of German Bight (with Heligoland)	13	2
Netherlands	Wonseradeel en Workum	13	1
Guinea-Bissau	Rio Mansôa and Gêba estuary	13	5
United Kingdom	Chichester and Langstone Harbours	12	4
France	Résèrve Naturelle de Moeze (Charente-Seudre)	12	7
Mauritania	Cap Blanc	12	1
Sierra Leone	Sierra Leone River Estuary	12	4
France	Anse du Fiers d'Ars en Ré	12	6
Germany	Rheiderland	12	2
France	Traits et marais salants de la Presqu'île Guérandaise	12	8
France	Ile d'Oléron, marais de Brouage-Saint-Agnant	11	8
United Kingdom	Upper Solway Flats and Marshes	11	5
Denmark	Mariager fjord	11	1
United Kingdom	Medway Estuary and Marshes	10	7
Morocco	Baie d'Ad Dakhla	10	5

5. Monitoring of reproduction and survival

5.1 Introduction

Monitoring of the bird populations that make use of the migratory flyways of which the international Wadden Sea is a part is currently focused on numbers, i.e. population size. However, there are two strong arguments for also considering the main underlying demographic drivers of population change, i.e. reproduction and survival, in monitoring programs.

First, looking into changes in or unnaturally low values of these demographic parameters is a logical first step in identifying the cause(s) of changes in population size. It can direct the search to certain parts of the annual cycle, and hence to certain geographical regions (e.g., a change in breeding productivity vs. a change in adult survival). In this way, it can also aid evaluation of observed trends; do they represent natural fluctuations or effects of human pressure?

Second, monitoring of demographic parameters can enable changes to be detected at an earlier stage, in two different ways. In long-lived species – which many Wadden Sea birds are – it may take several years until changes in e.g. breeding success become visible as changes in population size. In addition, detecting systematic change in numbers is hampered by random variation and error in bird counts. By analysing counts and demographic data in an integrated way, more information is used, potentially leading to more precise estimates of abundance and earlier detection of significant trends.

As a starting point for discussions on the development of such ‘integrated population monitoring’, this chapter provides an inventory of research and monitoring projects yielding information on breeding output and survival in bird populations for which the international Wadden Sea is of importance at some point in the annual cycle. The list is probably not complete, while some projects may also be included which have already finished or which do not collect demographic data (but focus on e.g., dispersal and migratory connectivity). However, it is the most comprehensive inventory of demography studies on Wadden Sea birds to date.

5.2 Material and methods

The focal unit of this inventory is the flyway population. We included studies on all flyway populations (as defined in Wetlands International 2006: Waterbird Population Estimates – Fourth Edition) for which the international Wadden Sea is of importance at some point in the annual cycle (for definition see chapter 2). For these populations, we searched for monitoring and research projects in which information is being collected on either (aspects of) reproductive output or annual survival probabilities. As the workshop aims to enhance future monitoring of Wadden Sea birds, we only include studies that are ongoing, and for which the information available indicated that they are likely to be intermediate- or long-term (with an intended running time of c. 5 years or more).

Many of the focal populations use both the Wadden Sea and other intertidal areas, or even non-tidal and inland habitats. In our search we have focused on studies in which data are gathered on coastal populations. For populations which are being studied only or mainly outside coastal habitats we have also included these studies, as long as there is no evidence that they involve sub-populations with dynamics that differ from those of coastal sub-populations.

The search was based on:

- personal knowledge of research activities along the flyway by the compilers (H. Schekkerman & M. van Roomen),
- an inventory of research projects assembling breeding success information in the international Wadden Sea, compiled for the Trilateral Monitoring and Assessment Program (Anonymus 2010),
- the data collection plan for the monitoring of breeding success parameters on Wadden Sea breeding birds within TMAP (Koffijberg & JMBB 2008),
- a search of the *Web of Science* for scientific papers on Wadden Sea birds (as defined above) and involving 'breeding success' or 'survival' (including several synonyms for these search terms),
- a search of the website by D. Raes on colour-marking projects in Europe (<http://home.scarlet.be/~pin02658/>) for projects on Wadden Sea species. Although this site does not give information on the aims and scope of all projects, we did try to select, on the basis of the information presented, those projects that:
 1. include birds likely to visit the Wadden Sea region at some point their annual cycle (which means that studies on birds breeding well south of the Wadden Sea were usually excluded even if they were part of the same flyway population),
 2. have a scope for producing data enabling annual estimates of survival rate (by mark-recapture or ring-recovery methods); these are either studies with medium to large numbers of marked birds and systematic resighting effort in either breeding or wintering sites, or studies with large numbers of marked birds relying on unsystematic resightings made by the general birdwatching community, and
 3. still seem to be active in the sense that new birds are being marked.

For each project, we tried to obtain the following information:

- species and flyway population(s) involved
- country and site(s) where the study is conducted
- whether birds are being studied or marked within or outside the international Wadden Sea
- starting year of the study (we assume that it is still running)
- whether breeding productivity and/or survival information are collected
- for breeding studies: type of output measure (hatching success of nests, juveniles fledged per pair, or proportion juveniles in population estimates from counts or ringing or from bag records (wing survey) obtained on migratory stopovers or wintering grounds).
- for breeding studies: approximate annual sample size for output measure (no. of nests or pairs under observation, number of birds sampled for age outside breeding season)
- for survival studies: type of survival data (mark-recapture or mark-resighting vs. dead recoveries of metal rings)
- for survival studies: approximate number of new birds marked per year
- institute or agency conducting the study
- name and e-mail address of main researcher or contact person
- website providing a description of the study
- key publications on/involving data from the study

Published and internet sources did not provide information on all of these aspects for many studies. Contact persons of projects for which information was missing or uncertain were therefore approached and asked to verify and/or provide information. Questionnaires were sent out by e-mail for a total of 66 studies, to 47 contacts of which 17 (36%) responded within four weeks. After this period, some studies for which information was still missing were removed because we considered it questionable whether the birds involved will regularly

occur within the trilateral Wadden Sea area, or whether the studies' scope is such that useful demographic estimates are to be expected. We did this to avoid giving an overly optimistic view of the number of relevant studies being conducted. The other studies remained on the list, with question marks in cells with missing information. These question marks make up the difference between the minimum and maximum numbers of studies presented in the Results section.

5.3 Results

Annex E Provides the full list of breeding and survival studies identified for each flyway population defined as important in chapter 2. Tables 5 and 6 summarise these data by species group, and table 7 by species.

5.3.1 Reproduction

Information is being collected on reproductive output of 65-71% of all 51 relevant populations, with multiple studies on some populations (67-78) studies in total. This may seem a fairly good coverage, but breeding output is not easily measured in many species so that local estimates may be imprecise, and it often shows considerable spatial variability. Both these points mean that for a representative estimate of annual breeding success, information from multiple studies is required. Only 16 of the 51 populations (31%) are covered by more than one study, but some of the studies (particularly the TMAP breeding success program which covers ten species) involve multiple sites.

There are 12 species in which breeding productivity is not systematically monitored at all; these involve Red-throated Loon, Common Shelduck, Northern Shoveler, Common Scoter, Red-breasted Merganser, Grey Plover, Bar-tailed Godwit, Whimbrel, Spotted Redshank, Common Greenshank, Little Gull, and Little Tern.

Table 5. Summary of information availability on breeding output for flyway populations of birds important in the international Wadden Sea. Given are the number of species and the number and proportion of populations in which studies are conducted, and the total number of studies involved. 'Min' and 'max' are minimum and maximum numbers, reflecting uncertainty about the aims and scope of part of the studies listed in Annex E (those with '?').

Group	N species	N pops	breeding output information collected in ..			
			N species min - max	N pops min - max	% pops min - max	N studies min - max
fish-eaters ^a	3	3	2	2	67	3 - 5
geese & ducks	13	14	9	10	71	14
shorebirds	17	22	12 - 13	14-16	64-73	25 - 28
gulls & terns	10	12	7 - 8	7-8	58-67	25 - 31
Total	43	51	30 - 32	33-36	65-71	67 - 78

^a Red-Throated Diver, Great Cormorant and Eurasian Spoonbill

Study effort seems to be reasonably well spread among four main taxonomic bird groups in the sense that all have similar percentage of all populations covered by at least one study. However, the type of reproductive output measure does vary between groups. Reproductive output of cormorants, spoonbills, terns and gulls is usually measured as number of young fledged per nest or breeding pair, in local studies. In (arctic-breeding) geese, it is usually

measured by estimating the proportion of juveniles in the population after arriving on the wintering grounds. This measure is in fact a combination of breeding output and survival of juveniles during their first migration, but has the advantage that it is easier to obtain a sample that is representative for the flyway as a whole. The same approach has been used in some duck and shorebird species, but there is unused potential in these groups for monitoring of breeding output in this way, either based on ringing catches or samples of birds aged on plumage characters in the field at an appropriate time of the year.

5.3.2 Survival

Information on annual survival is generally harder to obtain than information on breeding output, and this is reflected in a lower number of studies (table 6). Currently, survival data are collected in somewhat over half (55-61%) of all relevant flyway populations (51-64 studies in total). Fourteen (27%) of the 51 populations have more than one survival study on them. Compared to breeding studies, survival studies are less evenly spread among the main taxonomic groups: ducks and terns are covered notably less well than geese, cormorant, and spoonbill, with shorebirds in an intermediate position. A rather large number of colour-marking studies on gulls is being conducted, but so far these have produced relatively few published estimates of survival.

In 16 species, survival is not systematically studied at all: Red-throated Diver, Common Shelduck, Eurasian Wigeon, Common Teal, Mallard, Northern Pintail, Northern Shoveler, Greater Scaup, Red-breasted Merganser, Curlew Sandpiper, Common Greenshank, Spotted Redshank, Whimbrel, Little Gull, Sandwich Tern and Little Tern.

Most survival studies listed generate the mark-recapture type of survival data. There is also survival information in recoveries of dead birds with numbered metal rings that are reported to national ringing centres by the general public. Dead recovery analyses require far more birds to be ringed to obtain estimates with a similar precision as obtained through mark-resighting data, and as we do not know for which species numbers recovered are sufficiently large to conduct fruitful analyses, this approach is generally not listed as a survival study in Annex E, unless there is published proof of its feasibility. Thus, there is likely to be somewhat greater information potential than this inventory suggests.

Table 6. Summary of information availability on survival output for flyway populations of birds important in the international Wadden Sea. Given are the number of species and the number and proportion of populations in which studies are conducted, and the total number of studies involved. 'Min' and 'max' are minimum and maximum numbers, reflecting uncertainty about the aims and scope of some of the studies listed in Annex E (those with '?').

Group	N species	N pops	survival information collected in ..			
			N species min - max	N pops min - max	% pops min - max	N studies min - max
fish-eaters ^a	3	3	2	2	67	4
geese & ducks	13	14	4	5	36	8
shorebirds	17	22	12-14	14-18	58-75	18-41
gulls & terns	10	12	5-7	5-9	38-69	16-35
Total	43	51	25-27	28-31	55-61	51-64

^a Red-Throated Diver, Great Cormorant and Eurasian Spoonbill

Obviously, the most effective demographic monitoring is achieved when both reproduction and survival are covered by at least one study. This is the case in 25 populations (49%), involving 22 species, particularly Great Cormorant, Eurasian Spoonbill, geese, shorebirds and gulls (table 7). In some of these cases, however, reproduction and survival are studied in different localities or regions.

Table 7. Availability of information (number of studies, ranges indicate incomplete information) on breeding output and annual survival for flyway populations of birds, important in the international Wadden Sea. Populations are marked 'x' under 'Both' if both reproduction and survival are covered by at least one study.

Species	Population	Repro- duction	Survival	Both
Red-throated Diver	NW Europe (non-bre)	0	0	
Great Cormorant	sinensis, N, C Europe	3	2	x
Eurasian Spoonbill	leucorodia, E Atlantic	2	1	x
Greylag Goose	anser, NW Europe (bre)	2	3	x
Barnacle Goose	N Russia, E Baltic (bre)	1	1	x
Brent Goose	berniola	1	1	x
Brent Goose	hrota, Svalbard, N Greenland (bre)	1	1	x
Common Shelduck	NW Europe (bre)	0	0	
Eurasian Wigeon	NW Europe (non-bre)	2	0	
Common Teal	crecca, NW Europe (non-bre)	1	0	
Mallard	platyrhynchos, NW Europe (non-bre)	1	0	
Northern Pintail	NW Europe (non-bre)	1	0	
Northern Shoveler	NW & C Europe (non-bre)	0	0	
Greater Scaup	marila, W Europe (non-bre)	1	0	
Common Eider	mollissima, Baltic, Wadden Sea	3	2	x
Common Scoter	nigra	0	0	
Red-breasted Merganser	NW & C Europe (non-bre)	0	0	
Eurasian Oystercatcher	ostralegus	7	4	x
Pied Avocet	W Europe (bre)	3 - 5	0 - 2	
Common Ringed Plover	hiaticula	1	1	x
Kentish Plover	E Atlantic, W Mediterranean	1	1	x
Eurasian Golden Plover	altifrons, N Europe, extreme W Siberia (bre)	1	1	x
Grey Plover	squatarola, E Atlantic (non-bre)	0	0 - 1	
Red Knot	canutus	2	1	x
Red Knot	islandica	1	1	x
Sanderling	E Atlantic (non-bre)	1	1	x
Curlew Sandpiper	W Africa (non-bre)	1	0	
Dunlin	alpina	1	1	x
Dunlin	schinzii, Baltic (bre)	2	2	x
Bar-tailed Godwit	lapponica	0	1 - 2	
Bar-tailed Godwit	taymyrensis, W, SW Africa (non-bre)	0	1	
Whimbrel	phaeopus, NE Europe (bre)	0	0	
Eurasian Curlew	arquata	1	1	x
Spotted Redshank	Europe (bre)	0	0	
Common Redshank	robusta	0	0	
Common Redshank	totanus Northern Europe (breeding)	2	1 - 2	x
Common Greenshank	NW Europe (bre)	0	0	
Ruddy Turnstone	interpres, Fennoscandia, NW Russia (bre)	0	0	
Ruddy Turnstone	interpres, NE Canada, Greenland (bre)	1	2	x
Little Gull	N, C & E Europe (bre)	0	0	
Black-headed Gull	West & Central Europe (bre)	4	4	x
Common Gull	canus	1	3	x
Lesser Black-backed Gull	intermedius	5 - 6	4 - 6	x
Herring Gull	argentatus	0	0 - 1	
Herring Gull	argenteus	6 - 8	6 - 7	x

Table 7. Continued.

Great Black-backed Gull	NW Atlantic	0 - 2	1 - 4	
Sandwich Tern	sandvicensis, W Europe (bre)	2	0	
Common Tern	hirundo, N, E Europe (bre)	0	0	
Common Tern	hirundo, S, W Europe (bre)	4	3	x
Arctic Tern	N Eurasia (bre)	3	1	x
Little Tern	albifrons, W Europe (bre)	0	0	

6 Conclusions and recommendations

With the present monitoring initiatives focusing on the number of birds, the importance of the Wadden sea itself can be clearly followed (The JMMB project). However, existing monitoring is not yet sufficient to put the results of the Wadden Sea in a broader perspective, enabling adequate comparison of Wadden sea trends with flyway trends. Besides improvements in the coordination and data handling at flyway level, counting efforts in different regions also need to increase. Midwinter monitoring of numbers and trends is good in north-western Europe, adequate in northern and southwestern Europe, but insufficient in North Africa and in western Africa. Improvements need to be established in close cooperation with Wetlands International for the International Waterbird Census.

Much needs to be done to supplement the data on bird numbers with data on reproduction and survival. With all three data sources available, integrated population modelling can be performed enabling identification of causes of trends and predictions for the future under different management scenarios. There is information available on many species but data is not yet ready for efficient analyses and much more coordination is needed to improve the effectiveness and efficiency of data compilation.

Within the East Atlantic Flyway good possibilities exist to enlarge the cooperation on the monitoring of bird numbers with monitoring of vital rates.

Recommendations

- More comprehensive and standardised monitoring of numbers and trends, particularly in Africa.
- More effective and efficient coordination of the IWC at flyway level, improving the quantity and quality of the data and the regular feedback of results.
- Internationally coordinated surveys of colonially nesting species using standardised methodology.
- Expansion and coordination of the monitoring of reproduction and survival enabling analyses at flyway level.

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Annexes

Annex A

Migratory Waterbird species and populations occurring in the East Atlantic Flyway and the selection of those which are important in the Wadden Sea context. Species and populations according to Waterbird Population Estimates 4 (Wetlands International 2006). Selection of populations for the East Atlantic Flyway based on flyway delineations overlapping with west and southern Europe. See for selection of Wadden Sea populations chapter 2 (x = population is ecologically dependent on Wadden Sea habitats, n= numerically important but less dependent on Wadden Sea habitats).

Common name	Population (subspecies, biogeographical, flyway)	East-Atlantic Flyway	Wadden Sea
Red-throated Loon	NW Europe (non-bre)	x	x
Arctic Loon	arctica	x	
Common Loon	N Europe (non-bre)	x	
Yellow-billed Loon	Arctic Siberia	x	
Little Grebe	ruficollis	x	
Red-necked Grebe	grisegena, NW Europe (non-bre)	x	
Great Crested Grebe	cristatus, N & W Europe (non-bre)	x	
Horned Grebe	auritus, NW Europe (large billed)	x	
Black-necked Grebe	nigricollis, Europe, N Africa	x	
Great Cormorant	carbo, NW Europe	x	
Great Cormorant	sinensis, N, C Europe	x	x
Grey Heron	cinerea, W Europe, NW Africa (bre)	x	
Great Egret	alba, W, C & E Europe, Black Sea & E Mediterranean (bre)	x	
Purple Heron	purpurea, SW & NW Europe, NW Africa (bre)	x	
Cattle Egret	ibis, SW Europe	x	
Squacco Heron	ralloides, SW Europe, NW Africa (bre)	x	
Little Egret	garzetta, W Europe, NW Africa	x	
Black-crowned Night-heron	nycticorax, W Europe, NW Africa (bre)	x	
Great Bittern	stellaris, W Europe, NW Africa (bre)	x	
Little Bittern	minutus, W Europe, NW Africa	x	
Black Stork	SW Europe (bre)	x	
White Stork	ciconia, SW & W Europe (bre)	x	
Glossy Ibis	falcinellus, E & S Europe (bre)	x	
Eurasian Spoonbill	leucorodia, E Atlantic	x	x
Greater Flamingo	W Mediterranean	x	
Mute Swan	NW, C Europe	x	
Whooper Swan	Iceland (bre)	x	
Whooper Swan	N mainland Europe (bre)	x	
Tundra Swan	bewickii, NW Europe (non-bre)	x	n
Bean Goose	fabalis NW Europe (non-bre)	x	
Bean Goose	rossicus	x	n
Pink-footed Goose	Greenland, Iceland (bre)	x	
Pink-footed Goose	Svalbard (bre)	x	n
Greater White-fronted Goose	albifrons, Baltic - North Sea	x	n
Greater White-fronted Goose	flavirostris	x	
Lesser White-fronted Goose	Fennoscandia (bre)	x	
Greylag Goose	anser, Iceland (bre)	x	
Greylag Goose	anser, NW Europe (bre)	x	x
Barnacle Goose	E Greenland (bre)	x	
Barnacle Goose	Svalbard (bre)	x	
Barnacle Goose	N Russia, E Baltic (bre)	x	x
Brent Goose	bernicla	x	x
Brent Goose	hrota, Svalbard, N Greenland (bre)	x	x
Brent Goose	hrota, Ireland (non-bre)	x	
Ruddy Shelduck	NW Africa	x	

Annex A Continued

Common name	Population (subspecies, biogeographical, flyway)	East-Atlantic Flyway	Wadden Sea
Common Shelduck	NW Europe (bre)	x	x
Eurasian Wigeon	NW Europe (non-bre)	x	x
Gadwall	strepera, NW Europe (bre)	x	n
Common Teal	crecca, NW Europe (non-bre)	x	x
Mallard	platyrhynchos, NW Europe (non-bre)	x	x
Northern Pintail	NW Europe (non-bre)	x	x
Garganey	W Africa (non-bre)	x	
Northern Shoveler	NW & C Europe (non-bre)	x	x
Marbled Teal	W Mediterranean, W Africa	x	
Red-crested Pochard	C Europe & W Mediterranean	x	
Common Pochard	NE & NW Europe (non-bre)	x	
Tufted Duck	NW Europe (non-bre)	x	
Greater Scaup	marila, W Europe (non-bre)	x	x
Common Eider	mollissima, Baltic, Wadden Sea	x	x
Common Eider	mollissima, Norway, NW Russia	x	
King Eider	N Europe, W Siberia (bre)	x	
Steller's Eider	N Norway, SE Baltic (non-bre)	x	
Long-tailed Duck	Iceland, Greenland (bre)	x	
Long-tailed Duck	W Siberia, N Europe (bre)	x	
Common Scoter	nigra	x	x
Velvet Scoter	fusca, Baltic, W Europe (non-bre)	x	
Common Goldeneye	clangula, NW, Central Europe (non-bre)	x	
Smew	NW & C Europe (non-bre)	x	
Red-breasted Merganser	NW & C Europe (non-bre)	x	x
Common Merganser	merganser, NW & C Europe (non-bre)	x	
Common Crane	grus, NW Europe (bre)	x	
Water Rail	aquaticus	x	
Corncrake	W & NW Europe (bre)	x	
Spotted Crake	W & NW Europe (bre)	x	
Little Crake	parva	x	
Baillon's Crake	intermedia,	x	
Common Moorhen	chloropus, Europe, N Africa (bre)	x	
Common Coot	atra, NW Europe (non-bre)	x	
Eurasian Oystercatcher	ostralegus	x	x
Black-winged Stilt	himantopus, W & SW Europe, W Africa	x	
Pied Avocet	W Europe (bre)	x	x
Collared Pratincole	pratincola, W Mediterranean (bre)	x	
Northern Lapwing	Europe (bre)	x	n
Eurasian Golden Plover	apricaria	x	x
Eurasian Golden Plover	altifrons, Iceland & Faeroes (bre)	x	
Eurasian Golden Plover	altifrons, N Europe, extreme W Siberia (bre)	x	x
Grey Plover	squatarola, E Atlantic (non-bre)	x	x
Common Ringed Plover	hiaticula	x	x
Common Ringed Plover	(psammodroma)	x	x
Common Ringed Plover	tundrae	x	x
Little Ringed Plover	curonicus, W, Central Europe, NW Africa (bre)	x	
Kentish Plover	alexandrinus, E Atlantic, W Mediterranean	x	x
Eurasian Dotterel	Europe (bre)	x	
Eurasian Woodcock	Europe (bre)	x	
Jack Snipe	Europe (bre)	x	
Great Snipe	Scandinavia (bre)	x	
Common Snipe	gallinago, Europe (bre)	x	
Common Snipe	faeroeensis	x	
Black-tailed Godwit	limosa, W Europe (bre)	x	n
Black-tailed Godwit	islandica	x	n

Annex A Continued

Common name	Population (subspecies, biogeographical, flyway)	East-Atlantic Flyway	Wadden Sea
Bar-tailed Godwit	lapponica	x	x
Bar-tailed Godwit	taymyrensis, W, SW Africa (non-bre)	x	x
Whimbrel	phaeopus, NE Europe (bre)	x	x
Whimbrel	islandicus	x	
Eurasian Curlew	arquata	x	x
Spotted Redshank	Europe (bre)	x	x
Common Redshank	totanus Northern Europe (bre)	x	x
Common Redshank	robusta	x	x
Common Redshank	britannica	x	
Common Greenshank	NW Europe (bre)	x	x
Green Sandpiper	Europe (bre)	x	
Wood Sandpiper	NW Europe (bre)	x	
Common Sandpiper	N, W & C Europe (bre)	x	
Ruddy Turnstone	interpres, NE Canada, Greenland (bre)	x	x
Ruddy Turnstone	interpres, Fennoscandia, NW Russia (bre)	x	x
Red Knot	canutus	x	x
Red Knot	islandica	x	x
Sanderling	E Atlantic (non-bre)	x	x
Little Stint	Europe & West Africa (non-bre)	x	
Temminck's Stint	Europe, W Africa (non-bre)	x	
Curlew Sandpiper	W Africa (non-bre)	x	x
Purple Sandpiper	maritima, NE Europe & W Siberia (bre)	x	
Purple Sandpiper	maritima, NE Canada & NE Greenland (bre)	x	
Dunlin	alpina	x	x
Dunlin	schinzii, Iceland (bre)	x	
Dunlin	schinzii, Baltic (bre)	x	x
Dunlin	schinzii, Britain & Ireland (bre)	x	
Dunlin	arctica	x	
Ruff	W Africa (non-bre)	x	
Red Phalarope	Canada, Greenland, Iceland (bre)	x	
Common Gull	canus	x	x
Great Black-backed Gull	NW Atlantic	x	x
Glaucous Gull	hyperboreus	x	
Iceland Gull	glaucoides	x	
Herring Gull	argentatus	x	x
Herring Gull	argenteus	x	x
Yellow-legged Gull	cachinnans	x	
Lesser Black-backed Gull	fuscus	x	
Lesser Black-backed Gull	graellsii	x	
Lesser Black-backed Gull	intermedius	x	x
Black-headed Gull	West & Central Europe (bre)	x	x
Mediterranean Gull	Europe, SW Asia	x	
Little Gull	N, C & E Europe (bre)	x	x
Sabine's Gull	sabini	x	
Black-legged Kittiwake	tridactyla, East Atlantic (bre)	x	
Gull-billed Tern	nilotica, W Europe & W Africa (bre)	x	
Caspian Tern	Europe (bre)	x	
Sandwich Tern	sandvicensis, W Europe (bre)	x	x
Roseate Tern	dougalli, W Europe (bre)	x	
Common Tern	hirundo, S, W Europe (bre)	x	x
Common Tern	hirundo, N, E Europe (bre)	x	x
Arctic Tern	N Eurasia (bre)	x	x
Little Tern	albifrons, W Europe (bre)	x	x
Whiskered Tern	hybrida, W Europe, W Mediterranean (bre)	x	
Black Tern	niger	x	n

Annex B

Which countries are important for ‘Wadden Sea’ waterbird populations during breeding and wintering? For East Atlantic Flyway populations which are important in the Wadden Sea context (Table 1) the relative importance of breeding (green) and wintering (blue) countries are analysed. See Chapter 3 for the methods used in selecting these countries. . Colours indicate: (breeding) dark green = more than 5% of flyway population size, bright green 0,5-5 % and light green less than 0,5%, (wintering) dark blue = more than 5% of flyway population size, bright blue 0,5-5 % and light blue less than 0,5%.

Annex B

	Red-throated Loon, NW Europe (non-bre)	Great Cormorant, sinensis, N, C Europe	Eurasian Spoonbill, leucorodia, E Atlantic	Greylag Goose, anser, NW Europe (bre)	Barnacle Goose, N Russia, E Baltic (bre)	Brent Goose, bernicla	Brent Goose, hrota, Svalbard, N Greenland (bre)	Common Shelduck, NW Europe (bre)	Eurasian Wigeon, NW Europe (non-bre)	Common Teal, crecca, NW Europe (non-bre)	Mallard, platyrhynchos, NW Europe (non-bre)	Northern Pintail, NW Europe (non-bre)	Northern Shoveler, NW & C Europe (non-bre)	Greater Scaup, maifla, W Europe (non-bre)	Common Eider, mollissima, Baltic, Wadden Sea	Common Scoter, nigra	Red-breasted Merganser, NW & C Europe (non-bre)	Eurasian Oystercatcher, ostralegus
Canada																		
Greenland																		
Svalbard																		
Russia																		
Iceland																		
Norway																		
Sweden																		
Finland																		
United Kingdom																		
Estonia																		
Latvia																		
Lithuania																		
Belarus																		
Poland																		
Ireland																		
Denmark																		
Germany																		
Netherlands																		
Belgium																		
France																		
Czech Republic																		
Slovakia																		
Austria																		
Ukraine																		
Switzerland																		
Hungary																		
Romania																		
Bulgaria																		
Serbia																		
Slovenia																		
Albania																		
Macedonia																		
Greece																		
Italy																		
Spain																		
Portugal																		
Tunisia																		
Algeria																		
Morocco																		
Mauritania																		
Senegal																		
Guinea-Bissau																		
Gambia																		
Guinea																		
Sierra Leone																		
Mali																		
Niger																		
Ghana																		
Togo																		
Benin																		
Namibia																		
South Africa																		

Annex B Continued

	Pied Avocet, W Europe (bre)	Common Ringed Plover, hiaticula	Common Ringed Plover, psammodytoma / tundrae	Kentish Plover, alexandrinus, E Atlantic, W Mediterranean	Eurasian Golden Plover, apricaria	Eurasian Golden Plover, altifrons, N Europe, extreme W Siberia	Grey Plover, squatarola, E Atlantic (non-bre)	Red Knot, canutus	Red Knot, islandica	Sanderling, E Atlantic (non-bre)	Curlew Sandpiper, W Africa (non-bre)	Dunlin, alpina	Dunlin, schinzii, Baltic (bre)	Bar-tailed Godwit, taymyrensis, W, SW Africa (non-bre)	Bar-tailed Godwit, lapponica	Whimbrel, phaeopus, NE Europe (bre)	Eurasian Curlew, arquata
Canada																	
Greenland																	
Svalbard																	
Russia																	
Iceland																	
Norway																	
Sweden																	
Finland																	
United Kingdom																	
Estonia																	
Latvia																	
Lithuania																	
Belarus																	
Poland																	
Ireland																	
Denmark																	
Germany																	
Netherlands																	
Belgium																	
France																	
Czech Republic																	
Slovakia																	
Austria																	
Ukraine																	
Switzerland																	
Hungary																	
Romania																	
Bulgaria																	
Serbia																	
Slovenia																	
Albania																	
Macedonia																	
Greece																	
Italy																	
Spain																	
Portugal																	
Tunisia																	
Algeria																	
Morocco																	
Mauritania																	
Senegal																	
Guinea-Bissau																	
Gambia																	
Guinea																	
Sierra Leone																	
Mali																	
Niger																	
Ghana																	
Togo																	
Benin																	
Namibia																	
South Africa																	

Annex B Continued

	Spotted Redshank, Europe (bre)	Common Redshank, totanus Northern Europe (breeding)	Common Redshank, robusta	Common Greenshank, NW Europe (bre)	Ruddy Turnstone, interpres, NE Canada, Greenland (bre)	Ruddy Turnstone, interpres, Fennoscandia, NW Russia (bre)	Little Gull, N, C & E Europe (bre)	Black-headed Gull, West & Central Europe (bre)	Common Gull, canus	Lesser Black-backed Gull, intermedius	Herring Gull, argentatus / argentus	Great Black-backed Gull, NE Atlantic	Sandwich Tern, sandvicensis, W Europe (bre)	Common Tern, hirundo, S, W Europe (bre)	Common Tern, hirundo, N, E Europe (bre)	Arctic Tern, N Eurasia (bre)	Little Tern, albigens, W Europe (bre)
Canada																	
Greenland																	
Svalbard																	
Russia																	
Iceland																	
Norway																	
Sweden																	
Finland																	
United Kingdom																	
Estonia																	
Latvia																	
Lithuania																	
Belarus																	
Poland																	
Ireland																	
Denmark																	
Germany																	
Netherlands																	
Belgium																	
France																	
Czech Republic																	
Slovakia																	
Austria																	
Ukraine																	
Switzerland																	
Hungary																	
Romania																	
Bulgaria																	
Serbia																	
Slovenia																	
Albania																	
Macedonia																	
Greece																	
Italy																	
Spain																	
Portugal																	
Tunisia																	
Algeria																	
Morocco																	
Mauritania																	
Senegal																	
Guinea-Bissau																	
Gambia																	
Guinea																	
Sierra Leone																	
Mali																	
Niger																	
Ghana																	
Togo																	
Benin																	
Namibia																	
South Africa																	

Annex C

Preferred method for assessing population size and trend and the availability of flyway trends for waterbird populations in the East Atlantic flyway, which are important in the Wadden Sea context. The assessment of the preferred method for calculating total population size and flyway population trend is based on van Roomen (2010). The coding used is; 1= based on the IWC (yearly counts of sites in January supplemented with estimates of uncounted birds for assessing population size); 2= based on IWC-like methods carried out on a 3-5 year cycle involving, for example, synchronous sea duck counts and synchronous coverage of estuarine sites in West-Africa; 3= colony breeding bird counts, and 4= dispersed (common, rare, scarce) breeding bird counts. Trend availability is based on the Conservation Status Report for AEW (Wetlands International in prep.). Coding is 1= good trend available, 2= trend available but biased because of several reasons, 3= no trend available. The other columns give start year of the trend (first year that the amount of imputing is less than 70%), the percentage imputing in the remaining years used for the trend until 2007, the number of birds (average number in the last 10 years) used in the trend calculation, expressed as the percentage of the flyway population size and in the last column, an indication is given of whether the sites counted are distributed across the winter range (no bias) or that only part of the winter range is 'sampled' (biased sample).

Common Name	Population	Population size	Trend	Trend available?	start	% impute	% of pop size	bias in flyway coverage
Red-throated Diver	NW Europe (non-bre)	4	2	3				
Great Cormorant	sinensis, N, C Europe	3	1	1	1987	37	30	no
Eurasian Spoonbill	leucorodia, E Atlantic	3	2	2	1990	49	13	yes
Greylag Goose	anser, NW Europe (bre)	1	1	1	1983	30	63	no
Barnacle Goose	N Russia, E Baltic (bre)	1	1	1	1983	9	89	no
Brent Goose	bernicla	1	1	1	1983	17	47	no
Brent Goose	hrota, Svalbard, N Greenland (bre)	1	1	2	1988	8	10	yes
Common Shelduck	NW Europe (bre)	1	1	1	1983	15	77	no
Eurasian Wigeon	NW Europe (non-bre)	1	1	1	1983	14	74	no
Common Teal	crecca, NW Europe (non-bre)	1	1	1	1983	25	55	no
Mallard	platyrhynchos, NW Europe (non-bre)	4	1	1	1983	34	27	no
Northern Pintail	NW Europe (non-bre)	1	1	1	1983	12	90	no
Northern Shoveler	NW & C Europe (non-bre)	1	1	1	1983	19	80	no
Greater Scaup	marila, W Europe (non-bre)	2	2	2	1983	17	36	yes
Common Eider	mollissima, Baltic, Wadden Sea	2	2	3				
Common Scoter	nigra	2	2	3				
Red-breasted Merganser	NW & C Europe (non-bre)	2	2	2	1983	28	19	yes
Eurasian Oystercatcher	ostralegus	1	1	1	1983	31	70	no
Pied Avocet	W Europe (bre)	2	2	2	1984	43	68	yes
Common Ringed Plover	hiaticula	1	1	1	1983	32	55	no
Common Ringed Plover	psammmodroma/tundrae	2	2	2	1990	50	7	yes
Kentish Plover	alexandrinus, E Atlantic, W Mediterranean	4	2	2	1990	55	24	yes
Eurasian Golden Plover	apricaria	4	4	3				
Eurasian Golden Plover	altifrons, N Europe, extreme W Siberia (bre)	2	2	2	1983	25	20	yes
Grey Plover	squatarola, E Atlantic (non-bre)	2	2	2	1983	24	44	yes
Red Knot	canutus	2	2	3	2004	42	1	yes
Red Knot	islandica	1	1	1	1983	10	24	no
Sanderling	E Atlantic (non-bre)	2	2	2	1983	36	30	yes
Curlew Sandpiper	W Africa (non-bre)	2	2	3				
Dunlin	alpina	1	1	1	1983	22	90	no
Dunlin	schinzii, Baltic (bre)	4	4	3				
Bar-tailed Godwit	taymyrensis, W, SW Africa (non-bre)	2	2	3	1999	68	2	yes
Bar-tailed Godwit	lapponica	1	1	1	1983	14	75	no
Whimbrel	phaeopus, NE Europe (bre)	4	2	3				
Eurasian Curlew	arquata	1	1	1	1983	20	37	no
Spotted Redshank	Europe (bre)	4	2	2	1997	60	14	yes
Common Redshank	totanus Northern Europe (breeding)	4	2	2	1990	57	13	yes
Common Redshank	robusta	1	1	1	1983	16	34	no
Common Greenshank	NW Europe (bre)	4	2	3	1997	51	5	yes
Ruddy Turnstone	interpres, NE Canada, Greenland (bre)	1	1	1	1983	29	22	no
Ruddy Turnstone	interpres, Fennoscandia, NW Russia (bre)	2	2	3	1999	65	7	yes
Little Gull	N, C & E Europe (bre)	3	2	3				
Black-headed Gull	West & Central Europe (bre)	3	1	1	1991	31	26	no
Common Gull	canus	3	1	2	1983	28	8	yes
Lesser Black-backed Gull	intermedius	3	3	3				
Herring Gull	argentatus/argenteus	3	3	2	1993	16	10	yes
Great Black-backed Gull	NW Atlantic	3	3	2	1988	30	6	yes
Sandwich Tern	sandvicensis, W Europe (bre)	3	3	3				
Common Tern	hirundo, S, W Europe (bre)	3	3	3				
Common Tern	hirundo, N, E Europe (bre)	3	3	3				
Arctic Tern	N Eurasia (bre)	3	3	3				
Little Tern	albifrons, W Europe (bre)	3	3	3				

Annex D

Which sites are important for ‘Wadden Sea’ waterbird populations during wintering?

Important wintering sites for ‘Wadden Sea’ populations were selected based on the CSN Tool and the IWC database. For each population, the selection was based on the average occurrence of 1% of the flyway population size during the five most recent counts per site. The number of populations occurring in internationally important numbers during winter are given for each site, together with the summed international importance across the important populations wintering there.

Annex D Continued

	Summed international importance	Number of populations	Red-throated Diver, NW Europe (non-bre)	Great Cormorant, sinensis, N, C Europe	Eurasian Spoonbill, leucorodia, E Atlantic	Greylag Goose, anser, NW Europe (bre)	Barnacle Goose, N Russia, E Baltic (bre)	Brent Goose, bernicla	Brent Goose, hrota, Svalbard, N Greenland (bre)	Common Shelduck, NW Europe (bre)	Eurasian Wigeon, NW Europe (non-bre)	Common Teal, crecca, NW Europe (non-bre)	Mallard, platyrhynchos, NW Europe (non-bre)	Northern Pintail, NW Europe (non-bre)	Northern Shoveler, NW & C Europe (non-bre)	Greater Scaup, marila, W Europe (non-bre)	Common Eider, mollissima, Baltic, Wadden Sea	Common Scoter, nigra	Red-breasted Merganser, NW & C Europe (non-bre)	Eurasian Oystercatcher, ostralegus	Pied Avocet, W Europe (bre)	Common Ringed Plover, hiaticula	Common Ringed Plover, psammodytes / tundrae	Kentish Plover, alexandrinus, E Atlantic, W Mediterranean	Eurasian Golden Plover, apricaria	Eurasian Golden Plover, allifrons, N Europe, extreme W Siberia (bre)	Grey Plover, squatarola, E Atlantic (non-bre)
Russian Federation																											
Lower Yuribey	1	1	x																								
Norway																											
Smøla archipelago	2	1																									
Årland wetland system	2	1																									
Sweden																											
Bay of Lommabukten	3	1	x																								
Bråviken - Hävringe	2	1																									
Coastal areas of eastern Gotland island	1	1																									
Fälsterbo-Bay of Foteviken	13	5	x	x								x			x												
River Helgeån	3	2		x	x																						
Strandstuguviken	2	1														x											
Western part of lake Mälaren	1	1			x																						
United Kingdom																											
Abberton Reservoir	2	1																									
Alde Complex	3	2																				x					
Alt Estuary	6	2																									
Belfast Lough	1	1																									
Benfleet and Southend Marshes	8	4						x																			x
Blackwater Estuary: Total	6	2						x																			x
Breydon Water	1	1																									
Breydon Water & Berney Marshes	10	1									x																x
Burry Inlet	4	2																									
Camel Estuary	2	1																									
Carmarthen Bay	3	1																									x
Chesil Beach and the Fleet	2	1						x																			
Chew Valley	1	1																									
Chichester and Langstone Harbours	12	4						x														x					x
Chichester Harbour	1	1																									x
Crouch-Roach Estuary	1	1																									x
Deben Estuary	1	1						x																			
Dee Estuary	23	7									x												x				
Dengie Flats	5	3																									
Duddon Estuary	4	2																									
Dungeness To Pett Levels	1	1																									
Exe Estuary	1	1						x																			
Firth of Forth	5	3																									
Firth of Tay and Eden Estuary	1	1																									
Forth Estuary	1	1																									
Hamford Water	5	3						x																			x
Humber Estuary	35	7						x			x																x
Langstone Harbour	2	1						x																			
Lindisfarne	34	3																									x
Loch Leven	1	1																									
Lough Foyle (UK)	2	1																									x
Lough Foyle and River Foyle	2	1																									
Lough Neagh and Lough Beg	3	2																									x
Lower Derwent Ings	2	1																									x
Lower Derwent Valley	1	1																									
Maer Lake	1	1																									x
Martin Mere	2	1																									
Medway Estuary and Marshes	10	7						x																			x
Mersey Estuary	13	4																									
Mersey Narrows and North Wirral Foreshore	7	2																									
Mid-Essex Coast	35	9																									
Moray Basin, Firths and Bays	8	6																									
Morecambe Bay	31	9																									
Nene Washes	2	1																									
North Norfolk Coast	14	6																									x
North Wales Coast	3	1																									
Ouse Washes	9	5																									x
Pagham Harbour	3	2																									
Pegwell Bay	3	1																									x
Poole Harbour	1	1																									
Portsmouth Harbour	1	1						x																			
Ribble and Alt Estuaries	17	7																									x
Rutland Water	1	1																									
Severn Estuary	6	3																									
Solent Marshes and Southampton Water	4	1						x																			
Somerset Levels and Moors	8	4																									
South-west London Waterbodies	2	1																									

Annex D Continued

	Red Knot, canutus	Red Knot, islandica	Sanderling, E Atlantic (non-bre)	Curlew Sandpiper, W Africa (non-bre)	Dunlin, alpina	Dunlin, schinzii, Baltic (bre)	Bar-tailed Godwit, taymyrensis, W, SW Africa (non-bre)	Bar-tailed Godwit, lapponica	Whimbrel, phaeopus, NE Europe (bre)	Eurasian Curlew, arquata	Spotted Redshank, Europe (bre)	Common Redshank, tobianus Northern Europe (breeding)	Common Redshank, robusta	Common Greenshank, NW Europe (bre)	Ruddy Turnstone, interpres, NE Canada, Greenland (bre)	Ruddy Turnstone, interpres, Fennoscandia, NW Russia (bre)	Little Gull, N, C & E Europe (bre)	Black-headed Gull, West & Central Europe (bre)	Common Gull, canus	Lesser Black-backed Gull, intermedius	Herring Gull, argentatus/argenteus	Great Black-backed Gull, NE Atlantic	Sandwich Tern, sandvicensis, W Europe (bre)	Common Tern, hirundo, S, W Europe (bre)	Common Tern, hirundo, N, E Europe (bre)	Arctic Tern, N Eurasia (bre)	Little Tern, albigifrons, W Europe (bre)
Russian Federation																											
Lower Yuribey																											
Norway																											
Smøla archipelago																											
Årland wetland system																											
Sweden																											
Bay of Lommabukten																											
Bråviken - Hävinge																											
Coastal areas of eastern Gotland island																											
Falsterbo-Bay of Foteviken																											
River Helgeån																											
Strandstuguviken																											
Western part of lake Mälaren																											
United Kingdom																											
Abberton Reservoir																											
Alde Complex																											
Alt Estuary		x						x																			
Belfast Lough																											
Benfleet and Southend Marshes		x		x																	x						
Blackwater Estuary: Total																											
Breydon Water																											
Breydon Water & Berney Marshes																											
Burry Inlet																											
Camel Estuary																											
Carmarthen Bay																											
Chesil Beach and the Fleet																											
Chew Valley																											
Chichester and Langstone Harbours								x																			
Chichester Harbour																											
Crouch-Roach Estuary																											
Deben Estuary																											
Dee Estuary		x		x									x														
Dengie Flats		x						x																			
Duddon Estuary		x																									
Dungeness To Pett Levels																											
Exe Estuary																											
Firth of Forth		x						x																			
Firth of Tay and Eden Estuary								x																			
Forth Estuary																											
Hamford Water																											
Humber Estuary		x		x				x					x														
Langstone Harbour																											
Lindisfarne								x																			
Loch Leven																											
Lough Foyle (UK)																											
Lough Foyle and River Foyle								x																			
Lough Neagh and Lough Beg																											
Lower Derwent Ings																											
Lower Derwent Valley																											
Maer Lake																											
Martin Mere																											
Medway Estuary and Marshes																											
Mersey Estuary																											
Mersey Narrows and North Wirral Foreshore		x		x																							
Mid-Essex Coast				x				x																			
Moray Basin, Firths and Bays		x		x																							
Morecambe Bay		x		x				x		x																	
Nene Washes																											
North Norfolk Coast		x						x																			
North Wales Coast																											
Ouse Washes																											
Pagham Harbour																											
Pegwell Bay																											
Poole Harbour																											
Portsmouth Harbour																											
Ribble and Alt Estuaries								x																			
Rutland Water																											
Severn Estuary								x																			
Solent Marshes and Southampton Water																											
Somerset Levels and Moors																											
South-west London Waterbodies																											

Annex D Continued

	Summed international importance	Number of populations	Red-throated Diver, NW Europe (non-bre)	Great Cormorant, sinensis, N, C Europe	Eurasian Spoonbill, leucorodia, E Atlantic	Greylag Goose, anser, NW Europe (bre)	Barnacle Goose, N Russia, E Baltic (bre)	Brent Goose, bemicia	Brent Goose, ircta, Svalbard, N Greenland (bre)	Common Shelduck, NW Europe (bre)	Eurasian Wigeon, NW Europe (non-bre)	Common Teal, crecca, NW Europe (non-bre)	Mallard, platyrhynchos, NW Europe (non-bre)	Northern Pintail, NW Europe (non-bre)	Northern Shoveler, NW & C Europe (non-bre)	Greater Scaup, marila, W Europe (non-bre)	Common Eider, mollissima, Baltic, Wadden Sea	Common Scoter, nigra	Red-breasted Merganser, NW & C Europe (non-bre)	Eurasian Oystercatcher, ostralegus	Pied Avocet, W Europe (bre)	Common Ringed Plover, hiaticula	Common Ringed Plover, psammodroma / tundrae	Kentish Plover, alexandrinus, E Atlantic, W Mediterranean	Eurasian Golden Plover, apricaria	Eurasian Golden Plover, altifrons, N Europe, extreme W Siberia (bre)	Grey Plover, squatarola, E Atlantic (non-bre)
Stour and Orwell Estuaries	9	7					x		x					x													x
Strangford Lough and islands	3	2							x																		
Thames Estuary and Marshes	1	1																									
The Swale	6	5					x					x	x														
The Wash	25	5					x		x			x								x							x
Uists Machairs, Lochs and Coast	1	1																				x					
Upper Solway Flats and Marshes	11	5											x		x					x							
Latvia																											
Gulf of Riga, west coast	1	1																		x							
Poland																											
Delta of the Swina river	1	1																									
Lower Odra river valley	1	1														x											
Pomeranian bay	15	2																	x	x							
Vistula river mouth	2	1													x												
Ireland																											
Dundalk Bay	5	2																									
Dungarvan Harbour	1	1																									
Lough Foyle	3	2								x																	
Lough Ree	1	1												x													
Shannon and Fergus Estuaries	3	2																				x					
Wexford Harbour and Slops	2	1																									
Denmark																											
Danish Wadden Sea	28	7					x		x				x							x							
Eastern German Bight	16	3																	x								
Harbour + Agger Tanger	3	1						x																			
Horsens Fjord, Svanegrunden & Endelave	3	1														x											
Hyllekrog-Rødsand and Fehmarn Belt	4	1																		x							
Lillebælt	3	1																		x							
Mariager fjord	11	1							x												x						
Næra Coast and Æbelø area	1	1																			x						
Sejersø Bay and Nekselø	9	3														x	x	x									
Skagerrak-Southwest Norwegian trench	5	1																									
Stavns fjord	1	1							x																		
Stavnsfjord and adjacent waters	7	1																		x							
Germany																											
Alfsee	1	1														x											
Brodter Ufer	4	2															x	x									
Coast and lagoons of Western Pomerania	44	10	x	x	x					x		x	x	x						x		x					x
Coastline of Probstei	5	1																		x							
Danube valley: Regensburg-Vilshofen	1	1														x											
Dümmen	3	3											x														
Eastern bight of the Fehmarnsund	3	1																			x						
Eastern part of German Bight (with Heligoland)	13	2																				x					
Eastern part of Kiel Bight	9	2														x				x							
Einswarder Plate / Tegeler Plate	4	2																					x				
Elbe marshes between Stade and Otterndorf	19	6				x	x	x		x	x		x														
Elbe valley of Mecklenburg	1	1																									
Engerhafer Meede	1	1					x																				
Flensburger Innen- and Aussenförde	5	2														x	x										
Gandersum/Lange Maar	2	1					x																				
Greifswalder Bodden	64	6											x	x	x	x				x							x
Großer and Kleiner Jasmunder Bodden with Schmachter See and Nonn	3	1				x																					
Krautsand Süd: Binnendeichflächen	1	1					x																				
Krummhörn-Westermarsch	1	1																									
Lakes of Schwerin, Dambeck and Warin	2	1																									
Lauenburgische Seen Nature Park and Schaalsee area	1	1				x																					
Leine valley near Salzderhelden	1	1																									
Lewitz	2	1																									
Lower reaches of River Weser, embanked area	1	1					x																				
Lower reaches of River Weser, unembanked area	3	1									x																
Lower Rhine	2	2																									
Neustädter Bucht	2	1														x											
Niedersachsen Wattenmeer	21	6					x							x													
Nossentiner-/Schwinzer Heide with Krakower Obersee and Plauer See	1	1				x																					
Ostfriesische Meere	3	2																									
Otterndorf bis Oste: Belumer Außendeich	2	1					x																				x
Peenetal (Peenetalmoor and Anklamer Stadtbruch)	2	1												x													
Pomeranian bay	3	2																		x	x						
Putzarder See, Galenbecker See, Brohmer Berge	5	2				x										x											
Rheiderland	12	2					x																				
Rysumer Nacken	3	2																									

Annex D Continued

	Red Knot, <i>canutus</i>	Red Knot, <i>islandica</i>	Sanderling, E Atlantic (non-bre)	Curlew Sandpiper, W Africa (non-bre)	Dunlin, <i>alpina</i>	Dunlin, <i>schinzii</i> , Baltic (bre)	Bar-tailed Godwit, <i>laimyrensis</i> , W, SW Africa (non-bre)	Bar-tailed Godwit, <i>lapponica</i>	Whimbrel, <i>phaeopus</i> , NE Europe (bre)	Eurasian Curlew, <i>arquata</i>	Spotted Redshank, Europe (bre)	Common Redshank, <i>totianus</i> Northern Europe (breeding)	Common Redshank, <i>robusta</i>	Common Greenshank, NW Europe (bre)	Ruddy Turnstone, <i>interpres</i> , NE Canada, Greenland (bre)	Ruddy Turnstone, <i>interpres</i> , Fennoscandia, NW Russia (bre)	Little Gull, N, C & E Europe (bre)	Black-headed Gull, West & Central Europe (bre)	Common Gull, <i>canus</i>	Lesser Black-backed Gull, <i>intermedius</i>	Herring Gull, <i>argentatus/argenteus</i>	Great Black-backed Gull, NE Atlantic	Sandwich Tern, <i>sandvicensis</i> , W Europe (bre)	Common Tern, <i>hirundo</i> , S, W Europe (bre)	Common Tern, <i>hirundo</i> , N, E Europe (bre)	Arctic Tern, N Eurasia (bre)	Little Tern, <i>albigrons</i> , W Europe (bre)
Stour and Orwell Estuaries	x			x								x															
Strangford Lough and islands	x																										
Thames Estuary and Marshes				x																							
The Swale	x																										
The Wash																											
Uists Machairs, Lochs and Coast																											
Upper Solway Flats and Marshes				x			x																				
Latvia																											
Gulf of Riga, west coast																											
Poland																											
Delta of the Swina river																	x										
Lower Odra river valley																											
Pomeranian bay																											
Vistula river mouth																											
Ireland																											
Dundalk Bay		x						x																			
Dungarvan Harbour								x																			
Lough Foyle								x																			
Lough Ree								x																			
Shannon and Fergus Estuaries					x							x															
Wexford Harbour and Slob								x																			
Denmark																											
Danish Wadden Sea		x								x												x					
Eastern German Bight																	x		x								
Harbour + Agger Tønder																											
Horsens Fjord, Svanegrunden & Endelave																											
Hyllekrog-Rødsand and Fehmarn Belt																											
Lillebælt																											
Mariager fjord																											
Næra Coast and Æbelø area																											
Sejerø Bay and Neksø																											
Skagerrak-Southwest Norwegian trench																							x				
Stavns fjord																											
Stavnsfjord and adjacent waters																											
Germany																											
Alfsee																											
Brodter Ufer																											
Coast and lagoons of Western Pomerania																											
Coastline of Probstei																											
Danube valley: Regensburg-Vilshofen																											
Dümmer																											
Eastern bight of the Fehmarnsund																											
Eastern part of German Bight (with Heligoland)																											
Eastern part of Kiel Bight																											
Einswarder Plate / Tegeler Plate								x																			
Elbe marshes between Stade and Otterndorf																											
Elbe valley of Mecklenburg																											
Engerhafer Meede																											
Flensburger Innen- and Aussenförde																											
Gandersum/Lange Maar																											
Greifswalder Bodden																											
Großer and Kleiner Jasmunder Bodden with Schmachter See and Nonn																											
Krautsand Süd: Binnendeichflächen																											
Krummhörn-Westermarsch								x																			
Lakes of Schwerin, Dambeck and Warin																											
Lauenburgische Seen Nature Park and Schaalsee area																											
Leine valley near Salzderhelden																											
Lewitz																											
Lower reaches of River Weser, embanked area																											
Lower reaches of River Weser, unembanked area																											
Lower Rhine																											
Neustädter Bucht																											
Niedersachsen Wattenmeer																											
Nossentiner-/Schwinzer Heide with Krakower Obersee and Plauer See												x											x				
Ostfriesische Meere																											
Otterndorf bis Oste: Belumer Außendeich																											
Peenetal (Peenetalmoor and Anklamer Stadtbruch)																											
Pomeranian bay																											
Putzarer See, Galenbecker See, Brohmer Berge																											
Rheiderland																											
Rysumer Nacken		x						x																			

Annex D Continued

	Red Knot, <i>canutus</i>	Red Knot, <i>islandica</i>	Sanderling, E Atlantic (non-bre)	Curtlew Sandpiper, W Africa (non-bre)	Dunlin, <i>alpina</i>	Dunlin, <i>schinzii</i> , Baltic (bre)	Bar-tailed Godwit, <i>taymyrensis</i> , W, SW Africa (non-bre)	Bar-tailed Godwit, <i>lepponica</i>	Whimbrel, <i>phaeopus</i> , NE Europe (bre)	Eurasian Curlew, <i>arquata</i>	Spotted Redshank, Europe (bre)	Common Redshank, <i>totanus</i> Northern Europe (breeding)	Common Redshank, <i>robusta</i>	Common Greenshank, NW Europe (bre)	Ruddy Turnstone, <i>interpres</i> , NE Canada, Greenland (bre)	Ruddy Turnstone, <i>interpres</i> , Fennoscandia, NW Russia (bre)	Little Gull, N, C & E Europe (bre)	Black-headed Gull, West & Central Europe (bre)	Common Gull, <i>canus</i>	Lesser Black-backed Gull, <i>intermedius</i>	Herring Gull, <i>argentatus/argenteus</i>	Great Black-backed Gull, NE Atlantic	Sandwich Tern, <i>sandvicensis</i> , W Europe (bre)	Common Tern, <i>hirundo</i> , S, W Europe (bre)	Common Tern, <i>hirundo</i> , N, E Europe (bre)	Arctic Tern, N Eurasia (bre)	Little Tern, <i>albifrons</i> , W Europe (bre)
Sagasbank and eastern coast of Oldenburg																											
Schaalsee																											
Schlei																											
Schleswig-Holstein Wattenmeer		x						x		x												x					
Southern shore of Eckernförder Bucht																											
Stoller Grund, Gabelsflach and Mittelgrund																											
Traveförde and Dassower See																											
Usedom lagoon (Peenestrom, Achterwasser, Kleines Haff with Neuwarf)																											
Western shore of Lake Müritz																											
Wismar bay and Salzhaff																											
Netherlands																											
Alblasserwaard																											
Alkmaardermeer																											
Biesbosch																											
Donkse Laagten																											
Dutch Wadden Sea		x	x					x		x			x		x				x			x	x				
Eilandspolder																											
Fluessen-Heegermeer-Slotermeer e.o.																											
Gaasterland en Lemsterland																											
Gelderse Poort																											
Goeree																											
Grevelingen																											
Groote Wielen																											
Haringvliet																											
Hoeksmeer e.o.																											
Hollandsch Diep																											
IJssel																											
IJperveld, Varkensland and Twiske																											
Koeverdmeer e.o.																											
Krimpenerwaard																											
Lake Fluessen, Vogelhoek and Morra																											
Lake IJsselmeer																											
Lake Markermeer																											
Lake Sneekermeer and Goingarijp																											
Lake Witte and Zwarte Brekken																											
Lauwersmeer																											
Makkumer-and Kooiwaard																											
Midden-Delfland en Oude-Leede																											
Midden-Limburgse Maasplassen																											
North Sea north of the Wadden Sea																											
Oost-Zeeuwsch Vlaanderen																											
Oosterschelde		x						x		x																	
Oostvaardersplassen																											
Oude Land van Strijen																											
Oude Venen																											
Oudegaasterbrekken e.o.																											
Overflakkee																											
Polder Zeevang																											
Polders rond Fijnaart																											
Polders Ronde Hoep en Groot-Mijdrecht																											
Putten en Spui																											
Reeuwijkse Plassen																											
Schouwen-Duiveland																											
Sneekermeer e.o.																											
Steile Bank and Mokkebank																											
Terkaplesterpoelen and Akmarijp																											
Van Oordt's Mersken																											
Voordelta																											
Waal Nijmegen-Tiel																											
Waal Tiel-Zaltbommel																											
Waterland																											
Westerschelde and Saeftinghe																							x				
Westerschelde-oost en Saeftinghe																											
Wonseradeel en Workum																											
Wormer-and Jisperveld																											
Belgium																											
Blokkersdijk																											
Durme en Middenloop van de Schelde																											
IJzervallei-De Blankaart																											
Poldercomplex																											
Spaarbekken Merkem																											

Annex D Continued

	Summed international importance	Number of populations	Red-throated Diver, NW Europe (non-bre)	Great Cormorant, sinensis, N, C Europe	Eurasian Spoonbill, leucorodia, E Atlantic	Greylag Goose, anser, NW Europe (bre)	Barnacle Goose, N Russia, E Baltic (bre)	Brent Goose, bernicla	Brent Goose, hrota, Svalbard, N Greenland (bre)	Common Shelduck, NW Europe (bre)	Eurasian Wigeon, NW Europe (non-bre)	Common Teal, crecca, NW Europe (non-bre)	Mallard, platyhynchos, NW Europe (non-bre)	Northern Pintail, NW Europe (non-bre)	Northern Shoveler, NW & C Europe (non-bre)	Greater Scaup, marila, W Europe (non-bre)	Common Eider, mollissima, Baltic, Wadden Sea	Common Scoter, nigra	Red-breasted Merganser, NW & C Europe (non-bre)	Eurasian Oystercatcher, ostralegus	Pied Avocet, W Europe (bre)	Common Ringed Plover, hiaticula	Common Ringed Plover, psammoptera / fundrae	Kentish Plover, alexandrinus, E Atlantic, W Mediterranean	Eurasian Golden Plover, apricaria	Eurasian Golden Plover, alifrons, N Europe, extreme W Siberia (bre)	Grey Plover, squatarola, E Atlantic (non-bre)
Algeria																											
Sebkhet Djendli	2	1																						x			
Morocco																											
Baie d'Ad Dakhia	10	5																					x	x			
Lagune de Khnifiss	5	2		x																							
Marais Larache	3	2		x																	x						
Merja Zerga	21	3																			x	x					x
Oued Tahadart	2	1																						x			
Parc National de Dakhia	3	2																									
Parc National de Souss-Massa and Aglou	1	1		x																							
Plage Blanche - Ras Takoumba	1	1																									
Sahb al Majnoun	5	1																						x			
Sebkha Bou Areg	2	1																						x			
Zone Humide de Laayoune	2	1																						x			
Mauritania																											
Aftout es Sâheli	24	5		x																	x		x				
Banc d'Arguin National Park	516	13		x																		x	x	x			x
Cap Blanc	12	1																									
Chott Boul	8	1																			x						
Diawling National Park	7	2		x																	x						
Senegal																											
Cap Vert	8	1																									
Delta du Saloum	20	8		x																	x		x	x			x
Djoudj wetlands	22	2		x																	x						
Guembeul Avifaunal Reserve and St Louis lagoons	14	2		x																	x						
Lac de Guiers	2	1		x																							
Ndiael basin (including the 'Trois Marigots')	2	1																							x		
Guinea-Bissau																											
Arquipélago dos Bijagós	178	10																				x	x				x
Ilha de Bolama - Rio Grande de Buba	15	7																				x	x				x
Rio Mansôa and Gêba estuary	13	5																				x	x				x
Rio Tombali, Rio Cumbij# and Ilha de Melo	42	7																				x	x				x
Gambia																											
Niuni National Park	1	1																									
Tanji River (Karinti) Bird Reserve	4	2																									
Guinea																											
Konkouré	4	1																			x						
Rio Kapatchez	4	1																									
Sierra Leone																											
Sierra Leone River Estuary	12	4																					x	x			
Yawri Bay	14	6																					x				x
Mali																											
Lac Débo - Lac Oualado Débo	5	1																									
Niger																											
Mozagué reservoir	1	1																									
Ghana																											
Amansuri wetland	4	1																									
Densu Delta Ramsar Site	16	4																									
Keta Lagoon Ramsar Site	24	5																				x					
Muni-Pomadze Ramsar Site	6	2																									
Sakumo Lagoon Ramsar Site	5	2																									
Songor Ramsar Site	30	6																					x				
Namibia																											
Sandwich Harbour	3	3																									
Walvis Bay	1	1																									
South Africa																											
False Bay Park (proposed)	2	1																									
West Coast National Park and Saldanha Bay islands	1	1																									

Annex D Continued

	Red Knot, canutus	Red Knot, islandica	Sanderling, E Atlantic (non-bre)	Curlew Sandpiper, W Africa (non-bre)	Dunlin, alpina	Dunlin, schinzii, Baltic (bre)	Bar-tailed Godwit, taymyrensis, W, SW Africa (non-bre)	Bar-tailed Godwit, lapponica	Whimbrel, phaeopus, NE Europe (bre)	Eurasian Curlew, arquata	Spotted Redshank, Europe (bre)	Common Redshank, totanus Northern Europe (breeding)	Common Redshank, robusta	Common Greenshank, NW Europe (bre)	Ruddy Turnstone, interpres, NE Canada, Greenland (bre)	Ruddy Turnstone, interpres, Fennoscandia, NW Russia (bre)	Little Gull, N, C & E Europe (bre)	Black-headed Gull, West & Central Europe (bre)	Common Gull, canus	Lesser Black-backed Gull, intermedius	Herring Gull, argentatus/argenteus	Great Black-backed Gull, NE Atlantic	Sandwich Tern, sandvicensis, W Europe (bre)	Common Tern, hirundo, S, W Europe (bre)	Common Tern, hirundo, N, E Europe (bre)	Arctic Tern, N Eurasia (bre)	Little Tern, albigrons, W Europe (bre)	
Algeria																												
Sebkhet Djendli																												
Morocco																												
Baie d'Ad Dakhla	x	x					x																					
Lagune de Khnifiss		x																										
Marais Larache																												
Merja Zerga																												
Oued Tahadart																												
Parc National de Dakhla			x																				x					
Parc National de Souss-Massa and Aglou																												
Plage Blanche - Ras Takoumba			x																									
Sahb al Majnoun																												
Sebkha Bou Areg																												
Zone Humide de Laayoune																												
Mauritania																												
Aftout es Sâheli										x																		x
Banc d'Arquin National Park	x	x	x				x			x	x	x	x	x	x								x					
Cap Blanc																							x					
Chott Boul																												
Diawling National Park																												
Senegal																												
Cap Vert																							x					
Delta du Saloum				x																			x					
Djoudj wetlands																												
Guembeul Avifaunal Reserve and St Louis lagoons																												
Lac de Guiers																												
Ndiaël basin (including the 'Trois Marigots')																												
Guinea-Bissau																												
Arquipélago dos Bijagós	x	x	x				x			x	x						x											
Ilha de Bolama - Rio Grande de Buba	x		x								x						x											
Rio Mansôa and Gêba estuary							x																					
Rio Tombali, Rio Cumbij# and Ilha de Melo	x		x				x					x																
Gambia																												
Niumi National Park																								x				
Tanji River (Karinti) Bird Reserve																								x			x	
Guinea																												
Konkouré																												
Rio Kapatchez																												x
Sierra Leone																												
Sierra Leone River Estuary		x										x																
Yawri Bay	x		x									x		x														
Mali																												
Lac Débo - Lac Oualado Débo											x																	
Niger																												
Mozagué reservoir											x																	
Ghana																												
Amansuri wetland			x																									
Densu Delta Ramsar Site										x													x	x			x	
Keta Lagoon Ramsar Site										x																		
Muni-Pomadze Ramsar Site			x																									
Sakumo Lagoon Ramsar Site										x																		
Songor Ramsar Site										x				x									x	x				x
Namibia																												
Sandwich Harbour																							x	x	x			
Walvis Bay																										x	x	
South Africa																												
False Bay Park (proposed)																												
West Coast National Park and Saldanha Bay islands	x																											

Annex E**Overview of studies of reproduction and survival on ‘Wadden Sea’ waterbird populations within the flyway.**

Explanation of columns and coding

column	Description
Study ID	ID number of study (one study may include several populations/species)
Euring	Euring number of (sub)species
Species	English species name
Population	Population name (definitions as in Waterbird Population Estimates 4)
Country	Country where the study is (mainly) conducted (licence-plate abbreviations)
Site	Site(s) where the study is (mainly) conducted
WS	Whether main data collection sites are within (1) or outside (0) the trilateral Wadden Sea
Start	Starting year
Breeding	1 if the study collects data on aspects of reproductive output
Survival	1 if the study collects data on annual survival
BrType	Type of breeding study: main output measure hatching success (H), juveniles fledged per pair (F), or proportion juveniles in the population estimated on staging sites or wintering grounds(P).
Br_N	Approximate annual sample size (N of nests/pairs under observation, or N birds sampled for age; A=0-20, B=20-50, C=50-100, D=100-500, E=>500)
SType	Type of survival study: whether data type is mark-recapture or mark-resighting (M), or dead recoveries of metal rings (R)
S_N	Approximate number of new birds marked per year
Remarks	Other remarks concerning the study (e.g. part of TMAP program, other)
Institute	Institute(s) conducting the study
Contact Name	Name of contact person(s)
E-mail	E-mail address of contact(s)
Website	Website where the study is described
Key Publication	Reference to key publication on breeding/survival aspects of the study (for full references, see sheet 'reference list')
Gr	Species group for summary of data availability (FE fish-eaters (Red-throated Diver, Great Cormorant, Eurasian Spoonbill); W geese & ducks, S shorebirds, GT gulls & terns)
?	No information

Annex E

Study ID	Species	Population	Country	Site	WS	Start	Breeding (7/1)	Survival (7/1)	BrtType	Br. N	Stype	S. N
40	Eurasian Curlew	arquata	D	Nordhagen-Westfalen	0	<1980	1	1	?	?	M	?
	Spotted Redshank	Europe (bre)										
	Common Redshank	robusta										
18	Common Redshank	tolanus Northern Europe (breeding)	NL	Wieringen	1	2000	1	1	F	B	M	C
23	Common Redshank	tolanus Northern Europe (breeding)	D	Petersroden (aabeusan)	1	2000	1	?	H	B	M	?
	Common Greenshank	NW Europe (bre)										
	Ruddy Turnstone	interpres, Fennoscandia, NW Russia (bre)										
46	Ruddy Turnstone	interpres, NE Canada, Greenland (bre)	NL	Hondsbosscote Zeewiering Noord-Holland	0	2000	1	1	P	D	M	D
46	Ruddy Turnstone	interpres, NE Canada, Greenland (bre)	UK	Wash	0	2000						M, B
	Little Gull	N, C & E Europe (bre)	NL	2-5 sites	1	2005	1	1	F	C		
1	Black-headed Gull	West & Central Europe (bre)										
2	Black-headed Gull	West & Central Europe (bre)	D	1-6 sites	1	2009	1	1	F	C		
3	Black-headed Gull	West & Central Europe (bre)	DK	0-1 sites	1	2010	1	1	F	B		
8	Black-headed Gull	West & Central Europe (bre)	NL	Griend	1	1984	1	1	F	C		
34	Black-headed Gull	West & Central Europe (bre)	NL	TI sites	0	1985	1	1	F	?	M	D
35	Black-headed Gull	West & Central Europe (bre)	NL	Harderwijk & Zoetermeer	0	2005	1	1	F	?	M	D
48	Black-headed Gull	West & Central Europe (bre)	DK	?	?	?	?	?				
49	Black-headed Gull	West & Central Europe (bre)	B	Oost-Vlaanderen, Antwerpen & Limburg	0	2009		1			M, D	
34	Mew Gull	canus	NL	TI sites	0	2003	1	1	F	B		
47	Mew Gull	canus	DK	?	?	?	?	?			M, D	
50	Mew Gull	canus	EST	Matsalu Nature Reserve	0	1982	1	1	H, F	E	M	D
1	Lesser Black-backed Gull	intermedius	NL	2-3 sites	1	2005	1	1	F	C		
2	Lesser Black-backed Gull	intermedius	D	1-4 sites	1	2009	1	1	F	C		
3	Lesser Black-backed Gull	intermedius	DK	1 site: Langli	1	2010	1	1	F	B		
4	Lesser Black-backed Gull	intermedius	NL	Texel	1	2006	1	1	F	B		
48	Lesser Black-backed Gull	intermedius	DK	?	?	?	?	?			M, ?	
49	Lesser Black-backed Gull	intermedius	NL	Delta area, SW Netherlands	?	2003	1	1	F	?	M, ?	
52	Lesser Black-backed Gull	intermedius	NL	Limburg (North Sea coast)	0	?	?	?			M, ?	
53	Lesser Black-backed Gull	intermedius	NL	Amurijn (North Sea coast)	0	?	?	?			M, ?	
54	Lesser Black-backed Gull	intermedius	N	Amurijn & Helgoland	0	?	?	?			M, ?	
54	Lesser Black-backed Gull	argenteus	N	Sjælland	0	?	?	?			M, ?	
47	Herring Gull	argenteus	DK	Sjælland	0	?	?	?			M, ?	
51	Herring Gull	argenteus	NL	Delta area, SW Netherlands	0	2003	1	1	F	?	M, ?	
52	Herring Gull	argenteus	NL	Limburg (North Sea coast)	0	?	?	?			M, ?	
53	Herring Gull	argenteus	D	Limburg (North Sea coast)	0	?	?	?			M, ?	
56	Herring Gull	argenteus	D	Schleswig-Holstein	0	2001	1	1	F	?	M, ?	
1	Herring Gull	argenteus	NL	Kiel	1	2005	1	1	F	C		
2	Herring Gull	argenteus	D	5 sites	1	2005	1	1	F	C		
3	Herring Gull	argenteus	D	1-3 sites	1	2009	1	1	F	C		
3	Herring Gull	argenteus	DK	Langli	1	2009	1	1	F	B		
4	Herring Gull	argenteus	NL	Texel	1	2006	1	1	F	B		
48	Great Black-backed Gull	argenteus	D	Mellum	1	1985	1	1	F	B	M	A
53	Great Black-backed Gull	NW Atlantic	DK	?	?	2011	1	1	F	B	M	D
54	Great Black-backed Gull	NW Atlantic	D	Arrrunn & Helgoland	1	?	?	?	F	?	M	D
56	Great Black-backed Gull	NW Atlantic	N	Norway	0	?	?	?	F	?	M	?
1	Sandwich Tern	sandvicensis, W Europe (bre)	SV	Gotland	0	?	?	?	F	?	M	?
3	Sandwich Tern	sandvicensis, W Europe (bre)	NL	Griend	1	1994?	1	1	F	B		
1	Common Tern	sandvicensis, W Europe (bre)	DK	Langli	1	2008	1	1	H	?		
1	Common Tern	hirundo, N, E Europe (bre)	NL	6-8 sites	1	1982/2005	1	1	F	E		
2	Common Tern	hirundo, S, W Europe (bre)	D	3-5 sites	1	2009	1	1	F	C		
19	Common Tern	hirundo, S, W Europe (bre)	NL	Deilzijl, Emshaven	1	2007	1	1	F	?	M	C
21	Common Tern	hirundo, S, W Europe (bre)	D	Willemshaven	1	1980	1	1	F	?	M	?
22	Common Tern	hirundo, S, W Europe (bre)	D	Milsemer Oog, Oudooog	1	1981	1	1	F	?	M	?
1	Arctic Tern	N Eurasia (bre)	NL	2-3 sites	1	2005	1	1	F	E		
2	Arctic Tern	N Eurasia (bre)	D	3 sites	1	2009	1	1	F	C		
3	Arctic Tern	N Eurasia (bre)	DK	1 site	1	2010	1	1	F	B		
57	Arctic Tern	N Eurasia (bre)	NL	Deilzijl	1	2007	1	1	F	B		M, B

Annex E Continued

Study ID	Species	Population	Remarks	Institute	Contact Name
	Red-throated Loon	NW Europe (non-bre)			
30	Great Cormorant	Siberia, N, C Europe		RWS Waterdienst	S.van Rijn
31	Great Cormorant	Siberia, N, C Europe		NERI	T. Bregnballe
57	Great Cormorant	Siberia, N, C Europe	project until 2014, also looking at effects of measures directed to reduce damage to fisheries	University of Rosstock	H.M. Winkler
2	Eurasian Spoonbill	Leucorodia, E Atlantic	TMAP	LKN-NPV (S-H), Nationalparkverwaltung Wilhelmshaven (Nds)	B. Hallerlein (S-H), Gundolf Reichert (Nds)
24	Eurasian Spoonbill	Leucorodia, E Atlantic	TMAP	Wetgroep Lepelebar & Rijksuniversiteit Groningen	O. Overdijk (WLT), T. Perrema (RUG)
28	Grey/Vlag Goose	anser, NW Europe (bre)	Inland	SOVON	B. Vosjanber
28	Grey/Vlag Goose	anser, NW Europe (bre)	Inland	SOVON	B. Vosjanber
29	Grey/Vlag Goose	anser, NW Europe (bre)	Nordic Grey/Vlag Goose Project, since c. 200 breeding studies only in two lakes	University of Lund	L. Nilsson
29	Grey/Vlag Goose	anser, NW Europe (bre)	study mainly outside Wadden Sea	University of Lund	H. van der Deugd
9	Barnacle Goose	N. Russia, E Baltic (bre)	study mainly outside Wadden Sea	Vogelstation	H. van der Deugd
10	Barnacle Goose	N. Russia, E Baltic (bre)	study partly outside Wadden Sea	Goose Specialist Group, Wetlands International	K. Koljberg
10	Brent Goose	bernicla	study partly outside Wadden Sea	Goose Specialist Group, Wetlands International	K. Koljberg
10	Brent Goose	bernicla	study partly outside Wadden Sea	Goose Specialist Group, Wetlands International	K. Koljberg
12	Brent Goose	bernicla	study partly outside Wadden Sea	Goose Specialist Group, Wetlands International	K. Koljberg
12	Brent Goose	bernicla	study partly outside Wadden Sea	Goose Specialist Group, Wetlands International	K. Koljberg
25	Eurasian Wigeon	NW Europe (non-bre)	based on wings submitted by hunters	NERI	TK Christensen
26	Eurasian Wigeon	NW Europe (non-bre)	unknown whether still continued? Method only feasible in Wigeon among dabbling ducks	Wildfowl & Wetlands Trust	C. Mitchell
25	Common Teal	cecaea, NW Europe (non-bre)	based on wings submitted by hunters	NERI	TK Christensen
25	Mallard	platyrhynchos, NW Europe (non-bre)	based on wings submitted by hunters	NERI	TK Christensen
25	Northern Pintail	NW Europe (non-bre)	based on wings submitted by hunters	NERI	TK Christensen
25	Northern Shoveler	NW & C Europe (non-bre)	based on wings submitted by hunters	NERI	TK Christensen
25	Greater Scaup	marila, W Europe (non-bre)	based on wings submitted by hunters; ?enough to provide age ratios given an annual bag of c. 300?	NERI	TK Christensen
1	Common Eider	mollissima, Baltic, Wadden Sea	TMAP	SOVON & Inares	M. van Rooijen
13	Common Eider	mollissima, Baltic, Wadden Sea	now in TMAP - studies started by Swennen in 1980s; survival method R but M since 2008	SOVON & Inares (formerly NIOZ), Vogelrekstation	M. van Rooijen
25	Common Eider	mollissima, Baltic, Wadden Sea	based on wings submitted by hunters	NERI	TK Christensen
27	Common Eider	mollissima, Baltic, Wadden Sea	project on Eider population dynamics, 2007-2010	NERI	TK Christensen
Common Scaup		nigra			
Red-breasted Merganser		NW & C Europe (non-bre)			
1	Eurasian Oystercatcher	ostralegus	TMAP	SOVON & Inares	M. van Rooijen
2	Eurasian Oystercatcher	ostralegus	TMAP	LKN-NPV (S-H), Nationalparkverwaltung Wilhelmshaven (Nds)	B. Hallerlein (S-H), Gundolf Reichert (Nds)
3	Eurasian Oystercatcher	ostralegus	TMAP	NERI	K. Laursen
5	Eurasian Oystercatcher	ostralegus	TMAP	Inares	C. J. Smit
6	Eurasian Oystercatcher	ostralegus	TMAP	SOVON	B. J. Ens
7	Eurasian Oystercatcher	ostralegus	TMAP	SOVON and Vogelrekstation	B. J. Ens
41	Eurasian Oystercatcher	ostralegus	TMAP	NAU	H. Hoekker
1	Pied Avocet	W Europe (bre)	TMAP	SOVON & Inares	M. van Rooijen
2	Pied Avocet	W Europe (bre)	TMAP	LKN-NPV (S-H), Nationalparkverwaltung Wilhelmshaven (Nds)	B. Hallerlein (S-H), Gundolf Reichert (Nds)
32	Pied Avocet	W Europe (bre)	TMAP	private volunteer	Tory Martin
36	Pied Avocet	W Europe (bre)	TMAP	INGO	G. Sparoghe
37	Pied Avocet	W Europe (bre)	TMAP	Ringneerkringscenter, Zoologisch Museum, København	J. Sarng
38	Common Ringed Plover	halicula	TMAP	private volunteer	P. Wolf
38	Common Ringed Plover	halicula	TMAP	private volunteer	P. Wolf
18	Kentish Plover	alexandrine, E Atlantic, W Mediterranean	both adult and chicks are ringed in order to study the population dynamics, site fidelity and breeding success in the Delta area	Ringgroep Delta	P. Wolf
14	Eurasian Golden Plover	alifrons, N Europe, extreme W, Sierra (bre)	both adult and chicks are ringed in order to study the population dynamics, site fidelity and breeding success in the Delta area	Ringgroep Delta	P. Wolf
39	Grey Plover	squatarola, E Atlantic (non-bre)	Study mainly outside Wadden Sea	Ringsgroep Delta	P. Wolf
15	Red Knot	canutus	juvenile percentages provide an index of breeding productivity	Ringsgroep Delta	P. Wolf
33	Red Knot	canutus	juvenile percentages provide an index of breeding productivity	Ringsgroep Delta	P. Wolf
15	Red Knot	canutus	juvenile percentages provide an index of breeding productivity	Ringsgroep Delta	P. Wolf
17	Sanderling	E Atlantic (non-bre)	juvenile percentages provide an index of breeding productivity	Ringsgroep Delta	P. Wolf
33	Curllew Sandpiper	W Africa (non-bre)	marked population decline	University of Oulu	K. Kovula
42	Dunlin	schinzli, Baltic (bre)	marked population decline	University of Oulu	K. Kovula
43	Dunlin	schinzli, Baltic (bre)	marked population decline	University of Oulu	K. Kovula
44	Dunlin	schinzli, Baltic (bre)	marked population decline	University of Oulu	K. Kovula
16	Bar-tailed Godwit	leponica	probably mainly this subspecies	Wahsi Weder Ringing Group	B. Spaans, T. Perrema
39	Bar-tailed Godwit	leponica	probably mainly this subspecies	Wahsi Weder Ringing Group	B. Spaans, T. Perrema
16	Bar-tailed Godwit	leponica	probably mainly this subspecies	Wahsi Weder Ringing Group	B. Spaans, T. Perrema
16	Bar-tailed Godwit	leponica	probably mainly this subspecies	Wahsi Weder Ringing Group	B. Spaans, T. Perrema
Whimbrel		phaeopus, NE Europe (bre)			

Annex E Continued

Study ID	Species	Population	Remarks	Institute	Contact Name
40	Eurasian Curlew	arqata Europe (bre)		private study	M Kipp, C Kipp
	Spotted Redshank	Europe (bre)			
	Common Redshank	robusta			
18	Common Redshank	totalus Northern Europe (breeding)	breeding inland but often foraging in Wadden Sea	private + Vogeltraktation	W Tilsen
23	Common Redshank	totalus Northern Europe (breeding)		Inst f Vogeltraktation	M Exo, S Thyen
	Common Greenshank	NW Europe (bre)			
	Ruddy Turnstone	interpes, Farnoscandia, NW Russia (bre)			
45	Ruddy Turnstone	interpes, NE Canada, Greenland (bre)	We are colour marking turnstone to monitor the survival of this wintering species. We put in consistent efforts each year (one visit each fortnight from Oct to Apr) to resight these birds and therefore have a high resighting rate which should yield good survival estimates.	private project	N van Bredede, H Roerisma
46	Ruddy Turnstone	interpes, NE Canada, Greenland (bre)		Wash Wader Ringing Group	J Smart
	Little Gull	N, C & E Europe (bre)			
1	Black-headed Gull	West & Central Europe (bre)		SOVON & Imares	M. van Rooijen?sovon.nl
2	Black-headed Gull	West & Central Europe (bre)		LKN-NPV (S-H); Nationalparkverwaltung Wilhelmshaven (Nds)	B Hallerlein (S-H); Gundolf Reichert (Nds)
3	Black-headed Gull	West & Central Europe (bre)	TMAP; phime but not yet implemented in 2009	NERI	K Laursen
8	Black-headed Gull	West & Central Europe (bre)	run by colony wardens from 1992, with enclosures from 1994; now part of TMAP	Natuurmonumenten	D Lutterop
34	Black-headed Gull	West & Central Europe (bre)	wintering birds	private project	F Majoor
35	Black-headed Gull	West & Central Europe (bre)	breeding birds, inland	private project	F Majoor
48	Black-headed Gull	West & Central Europe (bre)	(only) fledglings are colour-marked; project aimed at dispersal and wintering of young birds	private project	K Pedersen
49	Black-headed Gull	West & Central Europe (bre)	wintering birds	private project	T Oudenaert
34	New Gull	canus			F Majoor
47	New Gull	canus			K Pedersen
50	New Gull	canus			
1	Lesser Black-backed Gull	intermedius		Institute of Agricultural and Environmental Sciences of Estonian University of Life Sciences	K Ralliste
2	Lesser Black-backed Gull	intermedius		SOVON & Imares	M. van Rooijen?sovon.nl
3	Lesser Black-backed Gull	intermedius		LKN-NPV (S-H); Nationalparkverwaltung Wilhelmshaven (Nds)	B Hallerlein (S-H); Gundolf Reichert (Nds)
4	Lesser Black-backed Gull	intermedius		NERI	K Laursen
41	Lesser Black-backed Gull	intermedius		NDZ	G J Campblysen
51	Lesser Black-backed Gull	intermedius		private project	K Pedersen
52	Lesser Black-backed Gull	intermedius		private project	R J Bujs
53	Lesser Black-backed Gull	intermedius		private project	F Collier
54	Lesser Black-backed Gull	intermedius		private project	S Marrens
54	Herring Gull	argenteus		Lisa Ringing Group	Lisa Ringing Group
47	Herring Gull	argenteus		private project	K Pedersen
51	Herring Gull	argenteus		private project	R J Bujs
52	Herring Gull	argenteus		private project	F Collier
53	Herring Gull	argenteus		private project	S Marrens
55	Herring Gull	argenteus		University of Kiel	N Markfors
1	Herring Gull	argenteus	no birds marked in 2009 and 2010; programme will continue in 2011 or 2012	SOVON & Imares	M. van Rooijen?sovon.nl
2	Herring Gull	argenteus		LKN-NPV (S-H); Nationalparkverwaltung Wilhelmshaven (Nds)	B Hallerlein (S-H); Gundolf Reichert (Nds)
3	Herring Gull	argenteus		NERI	K Laursen
4	Herring Gull	argenteus		NDZ	G J Campblysen
20	Herring Gull	argenteus	integrated population study	Mellinrat & Inst. Vogelforschung	G. Scheiffarth, M. Heckroth
48	Great Black-backed Gull	NW/Atlantic			K Pedersen
53	Great Black-backed Gull	NW/Atlantic			S Marrens
54	Great Black-backed Gull	NW/Atlantic		Lisa Ringing Group	Lisa Ringing Group
56	Great Black-backed Gull	NW/Atlantic		Lisa Ringing Group	Mans Hemmquist
1	Sandwich Tern	sandvicensis, W Europe (bre)		SOVON & Imares	M. van Rooijen?sovon.nl
3	Sandwich Tern	sandvicensis, W Europe (bre)		NERI	K Laursen
1	Common Tern	hirundo, N, E Europe (bre)		SOVON & Imares	M. van Rooijen?sovon.nl
2	Common Tern	hirundo, S, W Europe (bre)		LKN-NPV (S-H); Nationalparkverwaltung Wilhelmshaven (Nds)	B Hallerlein (S-H); Gundolf Reichert (Nds)
19	Common Tern	hirundo, S, W Europe (bre)			D Hienstra
21	Common Tern	hirundo, S, W Europe (bre)		Vogeltraktation	Inst f Vogeltraktation
22	Common Tern	hirundo, S, W Europe (bre)		Inst f Vogeltraktation	P Becker
1	Acatic Tem	N Eurasia (bre)		SOVON & Imares	M. van Rooijen?sovon.nl
2	Acatic Tem	N Eurasia (bre)		LKN-NPV (S-H); Nationalparkverwaltung Wilhelmshaven (Nds)	B Hallerlein (S-H); Gundolf Reichert (Nds)
3	Acatic Tem	N Eurasia (bre)		NERI	K Laursen
57	Acatic Tem	N Eurasia (bre)		NERI	D Hienstra
	Little Tern	albatross, W Europe (bre)		Vogeltraktation	

Annex E Continued

Study ID	Species	Population	E-mail	Website	Key Publication	mail response	Gr
	Red-throated Loon	NW Europe (non-bre)					FE
30	Great Cormorant	sinensis, N, C Europe	stef.van.rin@vus.nl	http://english.verkeerwatersstaat.nl/kernsplein/3/4/340580/2005_148X.pdf	http://english.verkeerwatersstaat.nl/kernsplein/3/4/340580/2005_148X.pdf		FE
31	Great Cormorant	sinensis, N, C Europe	td@dmu.dk	http://www.dmu.dk/dyplanter/dyv/skanvudkillingbestander/	Bergballe 2009		FE
57	Great Cormorant	sinensis, N, C Europe	helmut.winkler@uhn-hostock.de		Kellner ea 2010		FE
2	Eurasian Spoonbill	leucoroda, E Atlantic	bernd.haefliger@landst.de; gundolf.reicher@nlvz.waltemeer.niedersachsen.de				FE
24	Eurasian Spoonbill	leucoroda, E Atlantic	lpietsma@du.nl	www.wetgroepdebehar.nl	Lok ea 2009		FE
28	Greylag Goose	anser, NW Europe (bre)	l.vosjanber@sovoon.nl	http://www.sovon.nl/de/fault.asp?id=424	Van Turnhout ea 2003; Vosjanber & Van Turnhout 2008		WF
28	Greylag Goose	anser, NW Europe (bre)	l.vosjanber@sovoon.nl	http://www.sovon.nl/de/fault.asp?id=424			WF
29	Greylag Goose	anser, NW Europe (bre)	Liet Nilsen@zoochou.lu.se	http://www.zoo.krc.lu.se/waterforn/NordGas/NordGas.htm	Nilsen & Persson 1991	1	WF
29	Greylag Goose	anser, NW Europe (bre)	Liet Nilsen@zoochou.lu.se	http://www.zoo.krc.lu.se/waterforn/NordGas/NordGas.htm	Nilsen & Persson 1991	1	WF
9	Barbade Goose	N Russia, E Baltic (bre)	l.vandermeulen@du.nl	www.deese.dgk	Ebdunge ea 1991; van der Leugd ea 2009		WF
10	Barbade Goose	N Russia, E Baltic (bre)	kees.koelber@sovoon.nl	www.deese.dgk	van der Leugd ea 2009		WF
10	Bent Goose	bercula	kees.koelber@sovoon.nl	www.deese.dgk	Ebdunge & Spaans 1995		WF
10	Bent Goose	bercula	kees.koelber@sovoon.nl	www.deese.dgk			WF
12	Bent Goose	bercula, S island, N Greenland (bre)	l.vosjanber@sovoon.nl	www.deese.dgk			WF
	Common Shelduck	NW Europe (bre)	l.vosjanber@sovoon.nl		Clausen ea 2001		WF
25	Eurasian Wigeon	NW Europe (non-bre)	lk@dmu.dk	http://www.dmu.dk/en/about/en/dep/department/wildlifecology/biodiversity/projects/	Mitchell ea 2008	0	WF
26	Eurasian Wigeon	NW Europe (non-bre)	carl.mitchell@wvt.org.uk		Mitchell ea 2008	0	WF
25	Common Teal	creca, NW Europe (non-bre)	lk@dmu.dk	http://www.dmu.dk/en/about/en/dep/department/wildlifecology/biodiversity/projects/		0	WF
25	Malard	platyrynchos, NW Europe (non-bre)	lk@dmu.dk	http://www.dmu.dk/en/about/en/dep/department/wildlifecology/biodiversity/projects/		0	WF
25	Northern Pintail	NW Europe (non-bre)	lk@dmu.dk	http://www.dmu.dk/en/about/en/dep/department/wildlifecology/biodiversity/projects/		0	WF
	Northern Shoveler	NW & C Europe (non-bre)	lk@dmu.dk	http://www.dmu.dk/en/about/en/dep/department/wildlifecology/biodiversity/projects/		0	WF
25	Greater Scaup	marila, W Europe (non-bre)	lk@dmu.dk	http://www.dmu.dk/en/about/en/dep/department/wildlifecology/biodiversity/projects/	Van Kleunen ea 2010	0	WF
1	Common Eider	molissima, Baltic, Wadden Sea	marc.vanvoorn@sovoon.nl	http://www.dmu.dk/en/about/en/dep/department/wildlifecology/biodiversity/projects/	Kais 2007	0	WF
13	Common Eider	molissima, Baltic, Wadden Sea	marc.vanvoorn@sovoon.nl	http://www.dmu.dk/en/about/en/dep/department/wildlifecology/biodiversity/projects/	Christensen 2005	0	WF
25	Common Eider	molissima, Baltic, Wadden Sea	lk@dmu.dk	http://www.dmu.dk/en/about/en/dep/department/wildlifecology/biodiversity/projects/	Christensen 2005	0	WF
27	Common Eider	molissima, Baltic, Wadden Sea	lk@dmu.dk	http://www.dmu.dk/en/about/en/dep/department/wildlifecology/biodiversity/projects/	Christensen 2008	0	WF
	Common Scoter	nigra	lk@dmu.dk	http://www.dmu.dk/en/about/en/dep/department/wildlifecology/biodiversity/projects/	Christensen 2008	0	WF
	Red-breasted Merganser	NW & C Europe (non-bre)	marc.vanvoorn@sovoon.nl	http://www.dmu.dk/en/about/en/dep/department/wildlifecology/biodiversity/projects/	Van Kleunen ea 2010		WF
1	Eurasian Oystercatcher	ostralegus	bernd.haefliger@landst.de; poststale@nlvz.waltemeer.niedersachsen.de				WF
2	Eurasian Oystercatcher	ostralegus	bernd.haefliger@landst.de; poststale@nlvz.waltemeer.niedersachsen.de				WF
3	Eurasian Oystercatcher	ostralegus	lk@dmu.dk	http://www.dmu.dk/en/about/en/dep/department/wildlifecology/biodiversity/projects/	Oosterbeek ea 2006		WF
5	Eurasian Oystercatcher	ostralegus	gor.smit@wvt.nl		van der Pol ea 2010		WF
6	Eurasian Oystercatcher	ostralegus	duro.ans@sovoon.nl		Ems ea 2009		WF
7	Eurasian Oystercatcher	ostralegus	B.J. Ems: www.vogelreksiection.nl		Van Kleunen ea 2010		WF
41	Eurasian Oystercatcher	ostralegus	rabul.hst.hoelker@ec-online.de			0	WF
1	Pied Avocet	W Europe (bre)	marc.vanvoorn@sovoon.nl				WF
2	Pied Avocet	W Europe (bre)	bernd.haefliger@landst.de; gundolf.reicher@nlvz.waltemeer.niedersachsen.de				WF
32	Pied Avocet	W Europe (bre)	l.vosjanber@sovoon.nl			0	WF
36	Pied Avocet	W Europe (bre)	l.vosjanber@sovoon.nl			0	WF
37	Pied Avocet	W Europe (bre)	l.vosjanber@sovoon.nl			0	WF
38	Common Ringed Plover	halictula	plm.vor@gmail.com			0	WF
38	Kentish Plover	alexandrinus, E Atlantic, W Mediterranean	plm.vor@gmail.com		Eggen ea 2006	0	WF
14	Eurasian Golden Plover	alpinus, N Europe, extreme, W Siberia (bre)	lpietsma@du.nl	http://www.freservogelwachten.nl/nl/pagets/defaill/du/milsteren/ktroep.php	Peters ea 2005	0	WF
39	Grey Plover	squatarola, E Atlantic (non-bre)	shoebirds@nroz.nl			0	WF
15	Red Knot	caninus	shoebirds@nroz.nl	http://www.nroz.nl/noz_nl/noz_nl/6334/75/794/659e0fbee/57/ea/38cc.php	Kraan ea 2010		WF
33	Red Knot	caninus	shoebirds@nroz.nl	http://www.nroz.nl/noz_nl/noz_nl/6334/75/794/659e0fbee/57/ea/38cc.php	Blaumvis ea 2002		WF
15	Red Knot	caninus	shoebirds@nroz.nl	http://www.nroz.nl/noz_nl/noz_nl/6334/75/794/659e0fbee/57/ea/38cc.php	van Gils ea 2006		WF
17	Sandpiper	E Atlantic (non-bre)	J.V.H. Reneker@du.nl	http://www.wedderstidgroep.org/res/project/sandpiper.php	Blaumvis ea 2002		WF
33	Curtlew Sandpiper	W Africa (non-bre)	qetabhy@post.lufts.be			1	WF
42	Dunlin	alpinus	wvt.huisin@nmeac.com; barbara.ganley@ec-online.de			1	WF
43	Dunlin	schinzli, Baltic (bre)	qietonp@luqeliv@gmail.com		Tihoup 1999; 2004		WF
44	Dunlin	schinzli, Baltic (bre)	karl.kovulja@oulu.fi	https://wiki.oulu.fi/display/Animate/cology/Population%2C+conservation+and+evol		1	WF
16	Bar-tailed Godwit	lapponica	shoebirds@nroz.nl	http://www.nroz.nl/noz_nl/noz_nl/6334/75/794/659e0fbee/57/ea/38cc.php			WF
39	Bar-tailed Godwit	lapponica	shoebirds@nroz.nl	http://www.nroz.nl/noz_nl/noz_nl/6334/75/794/659e0fbee/57/ea/38cc.php			WF
16	Bar-tailed Godwit	lapponica	shoebirds@nroz.nl	http://www.nroz.nl/noz_nl/noz_nl/6334/75/794/659e0fbee/57/ea/38cc.php			WF
	Whimbrel	phaeopus, NE Europe (bre)	shoebirds@nroz.nl	http://www.nroz.nl/noz_nl/noz_nl/6334/75/794/659e0fbee/57/ea/38cc.php			WF

Annex E Continued

Study ID	Species	Population	E-mail	Website	Key Publication	mail response
40	Eurasian Curlew	Arquata Europe (bre)	Gert Kijp@konline.de		Boschert ea 1998	0
	Spotted Redshank	Arquata Europe (bre)				0
	Common Redshank	robusta				0
18	Common Redshank	tolanus Northern Europe (breeding)	wimlissen@planet.nl		Thyen & Exo 2005	0
23	Common Redshank	tolanus Northern Europe (breeding)	stefan.thyen@iv.terramare.de			0
	Common Greenshank	NW Europe (bre)				0
45	Ruddy Turnstone	Interpres, Femoscandia, NW Russia (bre)	vanbederode@hetnet.nl			1
	Ruddy Turnstone	Interpres, NE Canada, Greenland (bre)				1
46	Ruddy Turnstone	Interpres, NE Canada, Greenland (bre)	Jennifer.smar@rsdb.org.uk			0
	Little Gull	N, C & E Europe (bre)	marc.vanroomen@sovon.nl		Van Kleunen ea 2010	0
1	Black-headed Gull	West & Central Europe (bre)	bernd.haetlerlein@lkn.landsch.de; gundolf.reichert@nlpv-waltemmeer.niedersachsen.de		Thyen ea 1998	0
2	Black-headed Gull	West & Central Europe (bre)	waltemmeer.niedersachsen.de			0
3	Black-headed Gull	West & Central Europe (bre)	kl@dnu.dk	http://www.dnu.dk/en/aboutner/departments/wildlifeecology/biodiversity/projects/		0
8	Black-headed Gull	West & Central Europe (bre)	g.lilletterg@wvns.nl		Van Dijk & Oosterhuis 2010	1
34	Black-headed Gull	West & Central Europe (bre)	f.majoor5@upmail.nl	www.frankmajoor.nl		1
35	Black-headed Gull	West & Central Europe (bre)	f.majoor5@upmail.nl	www.frankmajoor.nl		1
48	Black-headed Gull	West & Central Europe (bre)	kbedersen@svm.ku.dk			0
49	Black-headed Gull	West & Central Europe (bre)	limaudeaenert@hotmail.com	http://www.bhgull.be/		1
34	New Gull	canus	f.majoor5@upmail.nl	www.frankmajoor.nl		0
47	New Gull	canus	kbedersen@svm.ku.dk			0
50	New Gull	canus	Kalev.Ralliste@emu.ee		Ralliste 2004	0
1	Lesser Black-backed Gull	intermedius	marc.vanroomen@sovon.nl		Van Kleunen ea 2010	0
	Lesser Black-backed Gull	intermedius	bernd.haetlerlein@lkn.landsch.de; gundolf.reichert@nlpv-waltemmeer.niedersachsen.de			0
2	Lesser Black-backed Gull	intermedius	waltemmeer.niedersachsen.de			0
3	Lesser Black-backed Gull	intermedius	kl@dnu.dk	http://www.dnu.dk/en/aboutner/departments/wildlifeecology/biodiversity/projects/		0
4	Lesser Black-backed Gull	intermedius	kees.camphuysen@noz.nl	http://www.noz.nl/noz_nie2b1a9a75319dc64c6162c93a9da7a8.php	Camphuysen & Grooten 2010	0
48	Lesser Black-backed Gull	intermedius	kbedersen@svm.ku.dk			0
51	Lesser Black-backed Gull	intermedius	jbuisje@hetnet.nl	http://buisjeconsuult.blogspot.com/; http://www.gull-research.org/moerdfik/		0
52	Lesser Black-backed Gull	intermedius	fred.cotlaar@hlsca.nl			0
53	Lesser Black-backed Gull	intermedius	S.Martens@KH-Herzoe.de			0
54	Lesser Black-backed Gull	intermedius	gjh@c21.net			0
54	Herring Gull	argenteus	kbedersen@svm.ku.dk			0
47	Herring Gull	argenteus	fred.cotlaar@hlsca.nl	http://buisjeconsuult.blogspot.com/; http://www.gull-research.org/moerdfik/		0
51	Herring Gull	argenteus	fred.cotlaar@hlsca.nl			0
52	Herring Gull	argenteus	S.Martens@KH-Herzoe.de			0
53	Herring Gull	argenteus	markones@tz-west.uni-kiel.de		Markones & Guse 2007	0
55	Herring Gull	argenteus	marc.vanroomen@sovon.nl		Van Kleunen ea 2010	1
1	Herring Gull	argenteus	bernd.haetlerlein@lkn.landsch.de; gundolf.reichert@nlpv-waltemmeer.niedersachsen.de			1
2	Herring Gull	argenteus	waltemmeer.niedersachsen.de			1
3	Herring Gull	argenteus	kl@dnu.dk	http://www.dnu.dk/en/aboutner/departments/wildlifeecology/biodiversity/projects/		1
4	Herring Gull	argenteus	kees.camphuysen@noz.nl	http://www.noz.nl/noz_nie2b1a9a75319dc64c6162c93a9da7a8.php	Camphuysen & Grooten 2010	1
20	Herring Gull	argenteus	gregor.scheiffarth@iv-vogelwarte.de		Wikens & Exo 1998	0
48	Great Black-backed Gull	NW Atlantic	kbedersen@svm.ku.dk			0
53	Great Black-backed Gull	NW Atlantic	S.Martens@KH-Herzoe.de			0
54	Great Black-backed Gull	NW Atlantic	gjh@c21.net			0
56	Great Black-backed Gull	NW Atlantic	marc.vanroomen@sovon.nl		Van Kleunen ea 2010	0
1	Sandwich Tern	sandvicensis, W Europe (bre)	marc.vanroomen@sovon.nl			0
3	Sandwich Tern	sandvicensis, W Europe (bre)	kl@dnu.dk	http://www.dnu.dk/en/aboutner/departments/wildlifeecology/biodiversity/projects/		0
1	Common Tern	hirundo, N, E Europe (bre)	marc.vanroomen@sovon.nl		Sitonen ea 2009	0
2	Common Tern	hirundo, S, W Europe (bre)	bernd.haetlerlein@lkn.landsch.de; gundolf.reichert@nlpv-waltemmeer.niedersachsen.de			0
	Common Tern	hirundo, S, W Europe (bre)	waltemmeer.niedersachsen.de			0
19	Common Tern	hirundo, S, W Europe (bre)	derckhienstra@hetnet.nl	http://www.aufaugangningen.nl/index.php?option=com_content&view=article&id=385&Itemid=84	Becker 1998	0
21	Common Tern	hirundo, S, W Europe (bre)	peter.becker@iv-vogelwarte.de	http://www.iv-vogelwarte.de/frame.php?id=50#SSBS	Becker 1998	0
22	Common Tern	hirundo, S, W Europe (bre)	peter.becker@iv-vogelwarte.de	http://www.iv-vogelwarte.de/frame.php?id=50#SSBS	Van Kleunen ea 2010	0
1	Arctic Tern	N Eurasia (bre)	marc.vanroomen@sovon.nl			0
2	Arctic Tern	N Eurasia (bre)	bernd.haetlerlein@lkn.landsch.de; poststelle@nlpv-waltemmeer.niedersachsen.de			0
3	Arctic Tern	N Eurasia (bre)	kl@dnu.dk	http://www.dnu.dk/en/aboutner/departments/wildlifeecology/biodiversity/projects/		0
57	Arctic Tern	N Eurasia (bre)	derckhienstra@hetnet.nl	http://www.aufaugangningen.nl/index.php?option=com_content&view=article&id=385&Itemid=84		0
	Little Tern	N Eurasia (bre)	derckhienstra@hetnet.nl	http://www.aufaugangningen.nl/index.php?option=com_content&view=article&id=385&Itemid=84		0

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Federal Ministry for the
Environment, Nature Conservation
and Nuclear Safety

