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AEWA Conservation Guidelines No. 9

Guidelines on Waterbird Monitoring

Ministry of Agriculture, Nature and Food Quality

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Guidelines on Waterbird Monitoring

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Picture on the cover: Participants of a waterbird monitoring training workshop in the Rusizi Delta Nature Reserve, Burundi. Photo © Szabolcs Nagy/Rubicon

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These AEWA Conservation Guidelines represent a full revision of and supersede the 2002 version (AEWA Technical Series No. 24).

Executive Summary

Monitoring the conservation status of migratory waterbirds and their habitats is crucial for effective conservation of their populations. It provides an understanding of which species and populations are priorities for targeted conservation action, and, if sufficiently comprehensive, the proximate and ultimate drivers of population change. Well-designed and well-run waterbird monitoring programmes not only help to fulfil the reporting requirements of multilateral environmental agreements (MEAs), such as the African-Eurasian Migratory Waterbird Agreement (AEWA), the Ramsar Convention on Wetlands or the EU Birds Directive, they also provide the evidence base from which to identify when, where and what sort of conservation and management actions are needed at site, national and flyway levels, as well as whether these actions actually deliver the expected changes or management outcomes.

The reporting requirements of MEAs help to implement this principle at the international level where collective decisions are taken by national governments to ensure that migratory waterbird populations are maintained in, or restored to, a favourable conservation status. According to the 6th edition of the AEWA Conservation Status Report[1], better monitoring has led to an improved conservation status of waterbirds through more comprehensive site designation and more sustainable use.

These guidelines provide support for the development and maintenance of national monitoring programmes that both support site and national level population monitoring and enable them to contribute to flyway level population size and trend estimates. The requirements for site, national and flyway-scale monitoring are broadly similar, but not always identical, thus clear objectives and selection of appropriate and standardised survey design, facilitates effective data sharing and flyway level analysis. Flyway level population size and trend estimates require monitoring activities to be implemented in the appropriate season and coordinated across the range for the selected species.

Monitoring the status of national populations and the importance of sites may require additional counts, but less coordination. These multiple objectives can be addressed through a comprehensive national monitoring programme, including breeding bird monitoring and regular, ideally monthly, counts of non-breeding birds at appropriately selected monitoring sites.

[1] https://www.unep-aewa.org/sites/default/files/document/mop6_14_csr6_including%20annexes.pdf

Importantly, monitoring programmes do not need to be overly expensive and much can be achieved for conservation with well-used resources. Trends can be detected based on relative population indices derived from annual counts at monitoring sites that adequately represent waterbird habitats (both protected and non-protected ones). Estimates of absolute population numbers may require more intensive methods than monitoring of trends, however it is sufficient to carry out such surveys periodically (e.g. once in every six years), although these periodic surveys should fit into an agreed international schedule to maximise their value to conservation.

Effective coordination of national programmes and the often extensive counter networks undertaking the surveys is also crucial. Much can be achieved through sustained coordination of counters, since most are volunteers and therefore provide the foundations for highly cost-effective monitoring programmes.

The value of sustained monitoring is often overlooked when decisions are made about resource allocation for national biodiversity conservation programmes. These guidelines, however, clearly set out the fundamental importance of monitoring to the continued success of biodiversity conservation and we hope they stimulate continued growth of national waterbird monitoring programmes and the attainment of the goals of AEWA.

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1. Introduction

Waterbirds are a highly valued component of wetland ecosystems for numerous reasons, including their provisioning, regulating, supporting and cultural ecosystem services. As such, many species play important ecological and economic roles, e.g. by contributing to local livelihoods.

Many waterbird species migrate through a number of countries between their breeding grounds and non-breeding areas during their annual life cycle. Not surprisingly therefore, waterbirds and their habitats are subject to multiple international treaties, including the Convention on Biological Diversity, the Ramsar Convention on Wetlands, the Convention on Migratory Species (CMS), the African-Eurasian Migratory Waterbird Agreement (AEWA), the Convention of European Flora and Fauna, the Birds Directive of the European Union and many other subregional legal instruments and initiatives.

Consequently, they are the subject of important conservation and management decisions, both at national and international levels. National governments, therefore, need reliable information on the population status of waterbirds in order to inform their own national policy development and decision-making processes (e.g. in relation to legislation on protected species, development of protected area networks, and managing hunting and other forms of waterbird harvest) and to participate in and inform international decisions and strategies. The 6th edition of the AEWA Conservation Status Report[2] concluded that waterbird declines are greater in areas with fewer contracting parties and where knowledge of the status of waterbirds and their key sites remains poor, while better monitoring leads to better protection of key sites and consequent improvements in the status and management of the exploitation of waterbirds. In this context, monitoring is an essential element of good governance, which is the most important determinant of good status of waterbirds[3] globally.

Contracting Parties to AEWA have committed to (i) establish collaborative monitoring programmes, where appropriate, according to Article III.2.(h) of the Agreement Text and endeavour to monitor the populations listed in Table 1, (ii) cooperate to improve the measurement of bird population trends, (iii) collaborate with relevant international organisations and (iv) support monitoring programmes according to paragraphs 5.2, 5.3 and 5.8 of the AEWA Action Plan[4]. These commitments were confirmed and strengthened by increasingly ambitious targets set out in the AEWA Strategic Plan 2009-2018[5] and the following AEWA Strategic Plan 2019-2027[6], as well as a number of Resolutions adopted at Sessions of the Meeting of the Parties to AEWA[7].

In order to underpin this process, the development of effective national monitoring programmes that can also contribute to international assessments is essential. Such a connection of national efforts of thousands of observers symbolises well how migratory waterbirds connect people across the flyway and how we can all play our role in protecting this shared resource.

[2] https://www.unep-aewa.org/sites/default/files/document/mop6_14_csr6_including%20annexes.pdf
[3] Amano, T., Székely, T., Sandel, B. Nagy, S., Mundkur, T., Langendoen, T., Blanco, D., Soykan, C. & Sutherland, W. (2018) Successful conservation of global waterbird populations depends on effective governance. Nature 553. 199 – 202 (11 January 2018). DOI: https://doi.org/10.1038/nature25139
[4] http://www.unep-aewa.org/sites/default/files/basic_page_documents/aewa_agreement_text_2016_2018_FINAL_correction%20made%20on%20p%2054_wcover.pdf
[5] http://www.unep-aewa.org/sites/default/files/basic_page_documents/strategic_plan_2009-2017_1.pdf (adopted for the period 2009-2017 by MOP4 in 2004 and extended till 2018 by MOP6 in 2015)
[6] https://www.unep-aewa.org/sites/default/files/basic_page_documents/aewa_strategic_plan_2019-2027_final.pdf
[7] The latest one is Resolution 6.3: http://www.unep-aewa.org/en/document/strengthening-monitoring-migratory-waterbirds-2

2. Aims of these guidelines

These guidelines are designed to support the development of national monitoring programmes, including their alignment with international programmes, for the conservation and management of national and international populations of waterbirds. As with other AEWA Conservation Guidelines, the target audience is the network of AEWA national focal points, as well as others who are responsible for the monitoring and management of waterbird populations and their key sites at a national level. We have mostly focused on the needs of flyway-scale population monitoring, which in many, but not all, cases will also provide the data needed for national monitoring objectives. We recognise, however, that in some cases, the requirements for national-scale monitoring are different to those needed for coordinated flyway-scale monitoring and that at times, these national requirements are a greater priority. Nevertheless, we strongly encourage national monitoring programme coordinators to take account of the requirements of flyway-scale monitoring when developing their national programmes, not least because contextual flyway-scale information is needed for the delivery of national waterbird conservation and management objectives, such as the protection of internationally important sites.

Chapter 2 clarifies some definitions and the taxonomic and spatial scope of this document.

Chapter 3 clarifies the multiple goals and objectives waterbird monitoring contributes at site, national and international level.

Chapter 4 addresses issues that relate to designing national monitoring programmes that are able to support both site management, national policies and can contribute to international assessment of waterbird populations. Here, we focus on the strategic design and avoid the technical aspects of sampling design and detailed description of survey methods, although we do refer to existing sources of further information (see Appendix 1). Appendix 2 lists the recommended methods for each waterbird population in the Agreement Area and for seabirds listed on AEWA Table 1 that would require the production of flyway-scale population size and trend estimates. Box 1 provides a set of questions that can be used to guide through the scoping phase of the design of a comprehensive but effective national monitoring scheme.

Chapter 5 provides an introduction to issues that relate to coordination and management of national monitoring schemes, which is the core activity in the implementation phase.

Chapter 6 focuses on data management, analysis and reporting, which turns the data collected during the monitoring activities into information and insight that can be acted upon at site-, national- and flyway level.

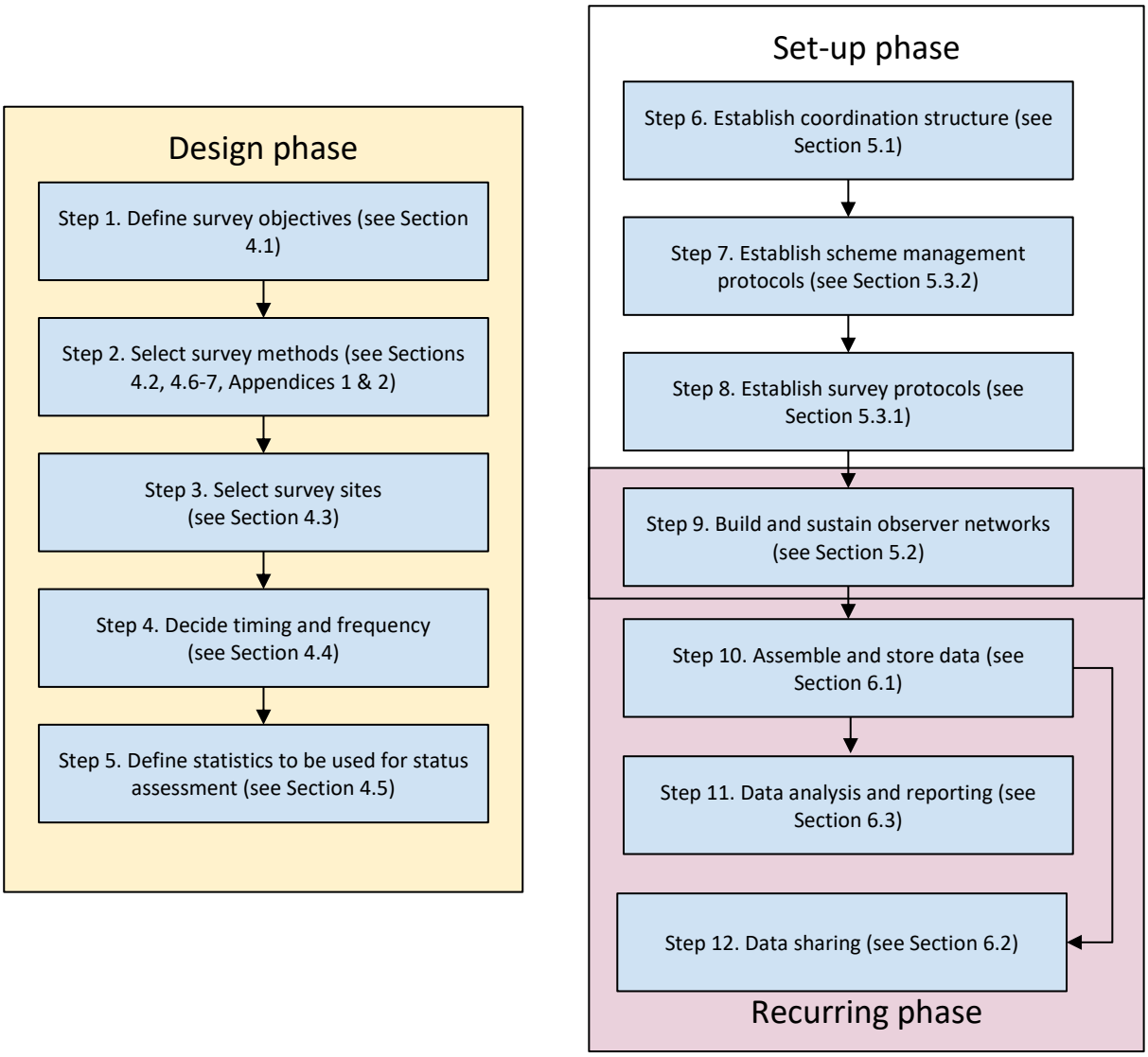

Figure 1. Overview of the overall process of setting up and running a monitoring scheme

These guidelines follow the guide-to-guidelines approach adopted by the AEWA Technical Committee and focuses on the provision of basic introductions and further reference to other more detailed guidance.

2.1 Definitions

Absolute population size or density - refers to the exact or true size or density of the population. This differs from the relative estimates of population size or density that are only an index of the population size.

Biogeographic population - is a population of a species or a sub-species that is either geographically discrete from other populations at all times of the year, or at certain times of the year only, or is a specified part of a continuous distribution so defined for the purposes of conservation management (Document AEWA/MOP3.12[8]).

Census – is a survey when information is collected about every member of the population (i.e. a total count).

[8] http://www.unep-aewa.org/sites/default/files/document/mop3_12_guidance_biographical_population_waterbird_0.pdf

Flyway - is the entire range of a migratory bird species (or groups of related species or distinct populations of a single species) through which it moves on an annual basis from the breeding grounds to non-breeding areas, including intermediate resting and feeding places as well as the area within which the birds migrate. For more details, see Boere & Stroud (2006)[9].

Monitoring - is a surveillance programme that compares its results to targets set in advance.

Population - in ecology, the population describes all individuals in an ecological community or administrative/management unit (e.g. site or national population, EU population, biogeographic population, etc.).

Sampling - is a survey when information is collected from a small representation of the population.

Surveillance - means repeatedly surveying something (e.g. population size) either through repeated censuses or sampling, in order to measure how it changes.

Survey – is a one-off appraisal of the status of something, it might be part of long-term surveillance.

2.2 Geographical and taxonomic scope

These guidelines cover all populations of the wetland-dependent species of the so-called waterbird families[10] in the AEWA Agreement Area[11] and the seabird populations listed on AEWA Table 1. The Critical Site Network Tool[12] provides access to further information on these populations.

The AEWA Agreement Area includes the Western Palearctic and the Afrotropic biogeographical realms, as well as part of the Nearctic in Greenland and northeast Canada, connected by three major multispecies flyways: (i) the East Atlantic, (ii) the Black Sea and Mediterranean, and (iii) the West Asian - East African[13].

3. The goal of monitoring: data needs and the integration of multiple objectives

The overall goal of waterbird monitoring programmes is to provide the data needed for effective conservation and management of waterbirds. This primarily concerns native species of conservation interest, but importantly these programmes can also monitor the status of non-native species that could become management concerns and thus all species present (native and non-native) should be recorded during surveys.

Monitoring is an integral part of the management process (Figure 2); monitoring data are used to undertake assessments of, for example, the status of the population or site, which leads to the identification and implementation of management actions based on the available evidence. Data from monitoring then provide feedback about the effects of the management actions undertaken and contribute to a new assessment of both the status and the effectiveness of the actions.

[9] http://jncc.defra.gov.uk/PDF/pub07_waterbirds_part1_flywayconcept.pdf
[10] http://wpe.wetlands.org/explore?conservation=1
[11] http://www.unep-aewa.org/en/legalinstrument/aewa
[12] http://criticalsites.wetlands.org/en/species
[13] http://wpe.wetlands.org/background/WAF

Figure 2. The conservation management decision cycle, indicating the crucial role of monitoring.

The objectives contributing to this goal are therefore:

- To establish population status (size and trend) both at site-, national- and flyway-level;
- To identify key sites and assess their condition; and
- To understand demographic drivers of changes in abundance

3.1 The importance of integrated monitoring

Monitoring programmes that address all of these objectives are called integrated monitoring programmes (Figure 3)[14]. This integrated approach provides valuable additional insight through understanding of why observed changes in bird abundance are happening, that basic abundance monitoring cannot. Integrated monitoring involves the regular integrated analysis of data collected by the monitoring of abundance, vital rates and, ideally, environmental conditions and pressures.

Vital rates monitoring and abundance monitoring link together (usually through the use of population models) to form demographic monitoring. It aims to uncover the drivers behind changes in abundance, to increase the possibilities for early warning and enables prediction of future population change. The interaction between the results of demographic monitoring and environmental monitoring will lead to an insight into the effects of human pressures and conservation measures.

[14] Further readings: https://www.waddensea-worldheritage.org/resources/integrated-monitoring-coastal-waterbird-populations-along-east-atlantic-flyway

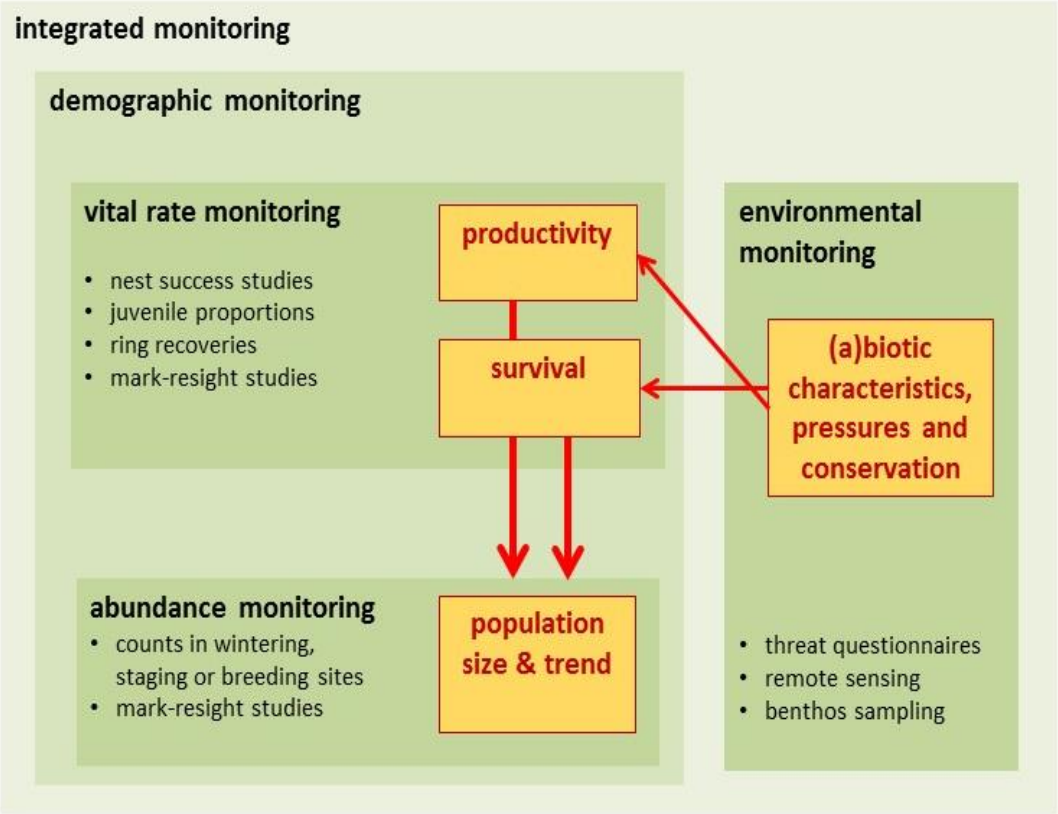

Figure 3. Components of integrated monitoring

It is important to note that integrated monitoring alone does not provide all the understanding needed to make sound conservation or management decisions. Demographic and environmental monitoring will signal problems, allow the generation of hypotheses concerning drivers of population declines and provide data for evaluation, but focused research will still be necessary to test these hypotheses and what measures can be implemented to address them effectively.

Integrated monitoring and research programmes are an effective way of identifying the drivers of changes in abundance. The information generated allows decision makers to implement cost-effective conservation policies without spending a lot of time checking too many possible drivers. In the case of conservation, it is particularly true that who gains time, gains everything because halting extinction is literally a race against the clock. The more time is spent on finding the causes of decline, the smaller the population will become.

3.2 From local to national and international, and back again

In addition to the integration of abundance, environmental and demographic monitoring at the site or national scale, effective monitoring at the population (flyway) scale requires close coordination between national monitoring programmes.

This coordination allows the importance of a country, and individual sites within that country, for any particular species to be quantified through the comparison of national population sizes and trends with those at an international (flyway) scale. This also allows local and national decision-makers to understand whether

national trends are likely to be the result of local or widespread factors (Figure 4)[15] and thus target conservation responses appropriately and effectively.

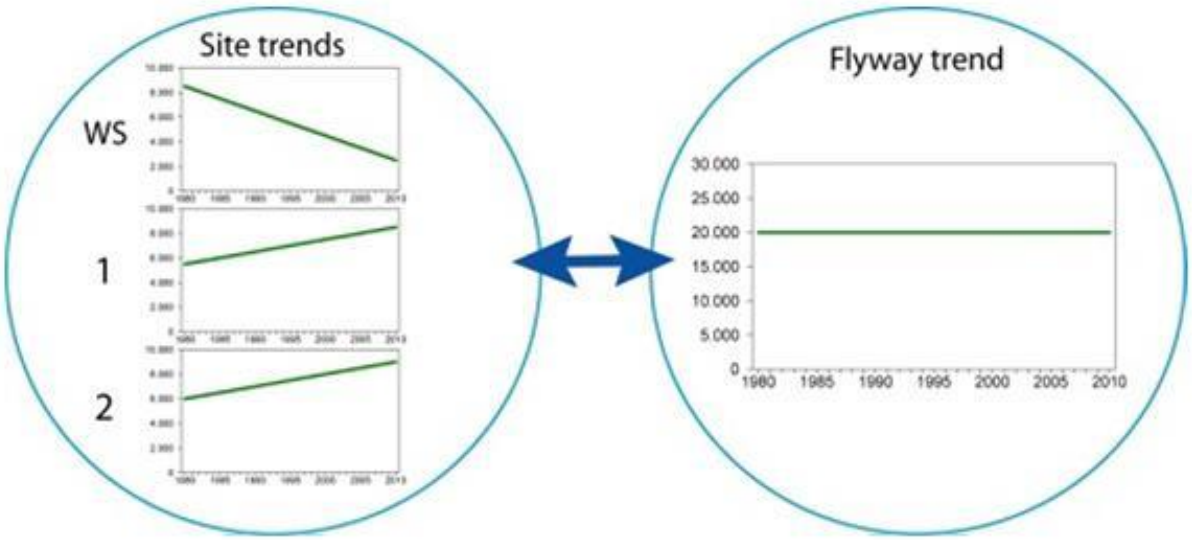

Figure 4. International monitoring allows comparison of local site trend (WS) with trends in other sites (1 and 2) and with the overall flyway trend.

National schemes will also undertake monitoring, particularly site-based monitoring, that does not necessarily require international coordination, e.g. if a population occurs in a country in significant numbers at a time of the year other than that when estimates of the size and trend of the flyway population are undertaken. However, common standards in methods and analyses will allow comparison of results between different studies.

4. Designing a national monitoring programme

Ideal national waterbird monitoring programmes will typically utilise a variety of methods for different surveys, selected to meet the survey objectives and any practical constraints, including those related to the ecology of the species.

Generally, the core part of a national monitoring programme will be a small number of multi-species surveys, such as the January and July waterbird counts and common and colonial breeding bird schemes, that aim to estimate the abundance and/or population trend of as many species as possible. Occasional supplementary surveys to address biases can result in correction factors that can be applied to generate improved trends or estimates of population size. Such multi-species surveys offer a high degree of cost effectiveness for both the collection of data, and also the survey organisation.

For species where a large multi-species survey is unsuitable, more focused schemes can be developed for suites of ecologically similar species that can be monitored using the same method, such as:

- geese and swans that can be counted at feeding sites (usually agricultural areas);

[15] https://europe.wetlands.org/wp-content/uploads/sites/3/2016/08/Rap_2012-22_FlywaytrendsTotaalLR.pdf

- species that gather at roost sites where it is easier to count them (e.g. geese, cranes, gulls, terns, cormorants, etc.);
- seaducks and other species wintering in inshore marine waters, such as divers and grebes, that can be counted together usually from a boat or an aeroplane;
- grassland plovers (Golden Plover (*Pluvialis apricaria*), Northern and Sociable Lapwing (*Vanellus vanellus, V. gregarius*) in Eurasia, Blacksmith and Senegal Lapwing (*V. armatus, V. lugubris*) in Africa);
- rocky coastline species (e.g. Purple Sandpiper (*Calidris purpurea*)).

Often, these schemes are undertaken at an interval of several years in order to supplement existing annual multi-species surveys, e.g. the Non-Estuarine Waterbird Survey in the United Kingdom which provides data on non-breeding waterbirds that occur away from well-monitored wetlands (such as most UK estuaries) and which is undertaken on a c.15 year cycle.

Some species, particularly crepuscular and nocturnal ones, can only be adequately surveyed using a species-specific method, such as:

- most crakes and flufftails which are best surveyed in the breeding season using playback methods;
- woodcock and snipes.

4.1 Selecting survey objectives

As stated in the introduction of Chapter 3, there are **three primary objectives** for a waterbird monitoring scheme designed to underpin waterbird conservation and management.

The **first objective** is crucial for the effective prioritisation of national and international conservation and management. It also contributes to national reporting obligations under:

- AEWA;
- for EU Member States, the EU Birds Directive Article 12 reporting[16];
- the European Red List of Birds[17];
- the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR)[18]; and
- the Baltic Marine Environment Protection Commission (HELCOM)[19] ecological status indicators contributing to reporting under the EU Marine Strategy Framework Directive.

In this context, status typically refers to an assessment of the overall abundance of a population and the trend of the population.

The **second objective** is important for the protection and adaptive management of key sites. Waterbird data at the site level, in conjunction with contextual information on overall flyway population status, allow sites of national or international importance to be identified and protection measures to be implemented. As explained in section 3.1, site monitoring also provides an understanding about whether observed trends in abundance are

[16] https://www.eionet.europa.eu/etcs/etc-bd/activities/reporting/article-12
[17] http://datazone.birdlife.org/info/euroredlist2021
[18] https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/biodiversity-status/marine-birds/bird-abundance/
[19] https://helcom.fi/action-areas/monitoring-and-assessment/monitoring-manual/

likely to be caused by local factors, that could be addressed by management actions, or other factors acting at broader scales. A good example for guiding site monitoring is the UK Joint Nature Conservation Committee's Common Standards Monitoring Guidance for Birds[20].
Bird surveys at key sites, especially when combined with other ecological data, are of fundamental importance for site management as they allow managers, both at the level of individual sites and at the level of networks of sites, to understand the effectiveness of site management measures at sustaining the species for which they are designated. Surveys also provide important information on site and habitat use, e.g. location of key roosts or feeding areas, or identifying potential threats that could be averted through adequate management actions.

The **third objective** provides valuable insight into the proximate causes of changes in abundance, and thus help understand ultimate drivers of change. In this way they have the potential to provide early warning of likely changes in abundance before they happen (in long-lived species) – see section 4.7.

Furthermore, whilst many waterbirds are monitored at the population scale during the non-breeding season, largely for pragmatic reasons (see below), monitoring of national breeding populations is also important in order to underpin effective protection and management during the breeding season.

4.2 Selecting survey methods

Once survey objectives have been agreed, the selection of an appropriate method will need to consider key questions such as:

1) Is there a need for either absolute or relative estimates of population size?

Absolute estimates are required for:

- Site identification – application of numeric criteria (e.g. Ramsar Criteria 5 and 6);
- Defining harvest quotas under dynamic harvest management systems; and
- Application of some criteria for Red List assessment and/or classification on AEWA Table 1.

Whereas relative estimates are sufficient for site, national and flyway trends.

If the survey objectives require obtaining absolute population size estimates, select a method that can produce statistically robust population size estimates, taking into account the distribution and detectability of the target species (see next questions). If the survey objective requires only relative estimates, much simpler methods will be sufficient. In most cases, it might not be possible to estimate the true density of the population, but the changes in the counted numbers or cues (e.g. goose droppings, calls) may correlate well with the absolute numbers and characterise well the trends in the population. Therefore, the methods to monitor trends can be much simpler and thus cheaper than the methods needed to obtain estimates of absolute population size.

In most cases, it is not necessary to estimate total population size, in order to estimate population trends. On the other hand, true population size is always fluctuating, as a result of both natural processes and as the results of various (mainly counting) errors. Therefore, detecting trends with certain statistical accuracy requires more repetitions than in the case of estimates of total population size. Consequently, the most cost-effective approach for national monitoring schemes is usually to combine annual monitoring of trends with periodic efforts to estimate absolute population size and use the result of the trend monitoring to index population size estimates between two size estimates.

[20] http://jncc.defra.gov.uk/pdf/CSM_birds_incadditionalinfo.pdf

2) Does the species have a clumped or dispersed distribution?

It is generally more feasible to undertake a complete count of a population with a highly clumped distribution (e.g. Northern Pintail (*Anas acuta*) in winter) than a dispersed distribution (e.g. Common Moorhen (*Gallinula chloropus*)). However, implementing complete censuses over large geographic areas is often not feasible, especially if both technical capacity (observers, optical equipment, vehicles) and resources are limited. Counter-intuitively, statistically sound sampling of species with clumped distributions is more difficult than dispersed species because of the higher variability of abundance in the samples (see calculations for power analysis e.g. in Greenwood & Robinson, 2006)[21]. A possible solution to this dilemma is to focus survey efforts on key sites that may comprise a high proportion of the national population and complement this with stratified sampling across the rest of the country to estimate the size and trend outside of this key site network.

It is also important to consider how variable the distribution of the clumped species is between survey periods. Periods when movements between sites are high, are less suitable for monitoring than periods when distribution is more predictable. This affects the site selection method (see below) and also the timing of the counts, e.g. the International Waterbird Census is timed to take place in mid-January because most of the relevant species are already at their wintering grounds but have not yet started their return migration.

3) Does the species have a high or low detection probability?

For species with low visual detectability (e.g. Water Rail (*Rallus aquaticus*)), species-specific methods may be more suitable for monitoring trends in abundance, e.g. call playback or standardised trapping programmes.

For all species, detection rate (and the ability of observers to see or correctly identify a species) also changes with the habitat and the distance over which they are being observed and this is also different for different species (e.g. small plovers can be safely identified up to a few hundred metres, but a flamingo could be identified up to a kilometre away). Distance sampling might therefore be necessary in some open habitats (e.g. mudflats, open sea - see Buckland et al. 2012[22] and http://distancesampling.org/) to account for the influence of species- and habitat-specific differences in the detectability of birds.

In addition, in some cases monitoring overall abundance or trends in abundance by direct observation might be prohibitively difficult, in which case some capture-recapture regimes or using a proxy measure might be more feasible, e.g. monitoring certain demographic rates through ringing/banding studies or the examination of hunters' bags (e.g. wing surveys).

4) When is the population geographically discrete?

The above-mentioned considerations are applicable at all levels, i.e. at site-, national- or international-levels. However, count data can only be used to characterise the status of a flyway population if it is collected in the season when that population is geographically separate from other populations. If the counts are carried out in seasons when populations are mixed, the data will characterise the status of the combined populations and it will require assumptions to use this for assessing the status of an individual population. However, sometimes there is no other realistic way to monitor a species (e.g. Long-tailed Duck (*Clangula hyemalis*)).

21 https://play.google.com/store/books/details/William_J_Sutherland_Ecological_Census_Techniques?id=rTJdia64ACMC

22 https://books.google.nl/books?id=GefqCAAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

Note that limited observer capacity and security concerns in some regions will continue to present a challenge to waterbird monitoring in the near future. Supplementing traditional count-based monitoring methods with a programme of capture-recapture / re-sighting schemes for selected wader and huntable (ducks) species may help to partly overcome these barriers.

In order to support the effective use of the resources available for flyway-scale monitoring, each waterbird population considered by these guidelines has been allocated a recommended census type, defining the method and timing (i.e. breeding or non-breeding season) for when it is recommended to monitor the flyway population size and trend (see Appendix 2).

In all cases, general multi-species methods were selected in preference to species-specific schemes, where these are applicable, unless established species-specific schemes already exist on a sufficiently large scale, because generalist schemes provide information for more populations and are more efficient to manage and thus more cost-effective in the case of limited organisational resources. If the population can be monitored effectively both in the breeding and the non-breeding season, a choice has been made between these two seasons.

In general, the breeding season is recommended for periodic population size estimates and the non-breeding season for trend estimates, taking into account the more comprehensive coverage of the International Waterbird Census across the flyway in comparison to breeding bird monitoring schemes, but also the difficulty of estimating population size using the former. Although such choices need to be made for flyway-level estimates, countries should also ensure that they monitor their national populations in the seasons when they occur there in important numbers, even if this does not match with the requirements for international monitoring.

Appendix 2 lists all populations that belong to a waterbird family in the AEWA Agreement Area regardless whether they are listed by AEWA (i.e. migratory) or not and all seabird populations listed on AEWA Table 1. Recommended general monitoring methods are in capital letters if they apply to national surveys or total counts. They are in lowercase letters if the method can be applied to a sample of sites (or count units within sites) to produce trends.

Detailed information on methods and monitoring frameworks are presented by Gilbert et al. (1998)[23] and van Roomen et al. (2013)[24] and in Appendix 1. Information on monitoring (i) vital rates and population structure, and (ii) site condition can be found in sections 4.6 and 4.7, respectively.

4.3 Selecting survey sites

The selection of survey sites depends on whether the survey methodology follows a sampling or a complete census approach. In the case of sampling (typically applied to dispersed species), it is important to ensure that the samples are representative of the whole. In the case of complete censuses (typically applied to colonial breeding species and non-breeding counts), it is important that the main concentrations are covered.

Selection of survey sites is relevant both for national surveys, and also in cases where large sites divided into sub-sites cannot all be covered by the available counter capacity.

There are a number of ways of selecting the sites to be included in a monitoring scheme.

[23] See links to sections of Gilbert et al. (1998) in Appendix 1

[24] Further readings: https://www.waddensea-worldheritage.org/resources/integrated-monitoring-coastal-waterbird-populations-along-east-atlantic-flyway

1) Self-selection by counter network

National monitoring schemes designed to estimate waterbird abundance are often carried out at sites largely selected by the counter network. This might lead to the under-representation of certain wetland habitats, e.g. linear habitats such as rivers, in survey coverage, which in turn can lead to bias in estimation of population size or trend. Such gaps can be addressed through occasional targeted surveys[25] and/or using environmental data which can then be used to provide a correction factor for subsequent assessments of population size (e.g. see Musgrove et al. 2011[26], Mendez et al. 2015[27]).

2) Selection by census coordinators

Self-selection can be improved through the direction of counters to key sites, in order to ensure that the most important national sites are surveyed.

3) Stratified (random) selection

In order to overcome constraints from the self-selection of sites, site selection can be based on a stratified approach. In this context, various randomisation techniques help to obtain statistically representative sampling that allows the production of less biased population estimates with confidence intervals. Further information is available in Greenwood & Robinson (2006[28]).

Shifts in non-breeding distributions are an increasingly relevant factor in determining the spatial scope of surveys. As a result of factors such as land-use change and, particularly, climate change, an increasing number of waterbird populations are undergoing population scale shifts in their non-breeding distributions (e.g. Lehikoinen et al. 2013). This represents a challenge for the continuation of effective monitoring of population status, as the spatial scope of surveys needs to adapt accordingly.

According to the WorldClim data[29], large areas of eastern Europe will become suitable for wintering waterbirds, thus expanding the counter network in these areas is an important priority in the short-term and beyond.

4.4 Timing and frequency

The timing and frequency of flyway population surveys need to be selected carefully according to practical considerations related to bird ecology and phenology, and the need to adhere to established survey and reporting cycles that are in place at a flyway scale.

For site-based monitoring, the different methods (and the timing of the surveys) will depend on the seasonal patterns in site use by waterbirds and the functions (breeding, stop-over, wintering) the site is used for.

4.4.1 Timing

[25] https://www.tandfonline.com/doi/pdf/10.1080/00063650609461423
[26] https://www.britishbirds.co.uk/wp-content/uploads/2010/12/waterbirds7.pdf
[27] Méndez, V., Austin, G.E., Musgrove, A.J., Ross-Smith, V.H., Hearn, R., Stroud, D.A., Wotton, S.R. & Holt, C.A. (2015). Use of environmental stratification to derive non-breeding population estimates of dispersed waterbirds in Great Britain. *Journal for Nature Conservation* 28: 56-66. DOI: https://doi.org/10.1016/j.jnc.2015.09.001
[28] In Sutherland (Ed.) Ecological Census Techniques
https://play.google.com/store/books/details/William_J_Sutherland_Ecological_Census_Techniques?id=rTJdia64ACMC
[29] http://worldclim.org/CMIP5v1

For surveys of non-breeding birds, multi-species surveys are typically carried out in January (for northern hemisphere breeding species) and July (for certain Afrotropical breeding species). For those species best monitored, either at site, national or flyway level, during migration periods, the exact timing of spring or autumn surveys will depend on the phenology of the species concerned.

For surveys of breeding birds, the timing will depend on both the timing of the breeding season of the species concerned and the precise period within the breeding season at which it is most effective to conduct a survey, e.g., incubation or brood rearing periods. Examples of the best timing for species breeding in the UK are provided in Gilbert et al. (2011)[30]. Timing of breeding bird surveys is more complicated in Africa where different species breed at different times, depending on factors such as local rainy seasons and floods, and therefore exhibit less clear seasonality or annual cycles compared to birds breeding in the temperate zone[31]. The relative timing of their breeding season can be checked on the BirdLife DataZone[32], the Birds of the World[33] or other relevant literature.

It is crucial during any surveys in the breeding season that disturbance is minimised and does not have any impact on the breeding attempts being made by surveyed birds.

Ideally, flyway populations should be monitored at the time of year and at sites when they are not mixed with other populations of the same species from which they cannot be distinguished in the field. In order to obtain a robust estimate of flyway-scale population size and population trend, this needs to be carried out sufficiently across its range and coordinated across relevant range states.

When conducting a national monitoring programme, the key issue to address regarding the timing of surveys for estimating national population size is whether the timing is different to that required for flyway population surveys. This will depend on the seasonal occurrence of the species in the particular country, and this might be only determined following more frequent surveys (see below). Otherwise, it is simply necessary to follow the same principles outlined above, just without the need to coordinate at a flyway scale.

For monitoring site importance, more frequent counts are usually required, since standard January counts (e.g., for flyway population monitoring) alone will not be sufficient to identify sites of international importance for breeding or as migration stop-over and staging sites (see below).

Issues to pay attention to when determining the timing of site counts include:

- Monitoring birds on migration that have short stop-over periods is more difficult than monitoring those with a longer period of stay. Where turnover is high, the synchronisation of counts must be especially good, e.g. the annual autumn census of Icelandic Pink-footed Geese[34];

- Periods of peak numbers might vary between years (e.g. depending on weather conditions), meaning it might not be effective to carry out a count on a fixed date each year; a pre-survey assessment to help plan the count might therefore be necessary, especially if the period of peak occurrence is short.

[30] https://rbbp.org.uk/bird-monitoring-methods/
https://books.google.nl/books?id=55FOuAAACAAJ&dq=gilbert+bird+monitoring&hl=fy&sa=X&ved=0ahUKEwiViOGlu4DdAhVJbVAKHfy3C6oQ6AEIJDAA
[31] https://www.unep-aewa.org/sites/default/files/document/mop5_inf_5_3_breed_and_migr_periods_0.pdf
[32] http://datazone.birdlife.org/species/search
[33] https://birdsoftheworld.org/bow/home
[34] https://monitoring.wwt.org.uk/our-work/goose-swan-monitoring-programme/abundance/igc/

To be able to detect changes in numbers at sites, it is important that the same method is applied from year to year once an appropriate method is established. If methods need to be changed to take advantage of technical or methodological advances, it is important to calibrate the new method with the old one. Depending on the seasonal occurrence of the qualifying species at the site, both breeding and non-breeding methods might be needed. In many African countries, for example, the presence of breeding and non-breeding migrant species may overlap.

4.4.2 Frequency

Monitoring a trend should ideally be based on annual indices, with once in every three years recommended as an absolute minimum. However, the detection of trends requires a series of data points and, therefore, the greater the time period between index values, the longer it will take to detect a trend with a certain statistical certainty, which could delay the implementation of remedial actions for declining species. Furthermore, during counts all sorts of (stochastic) errors can occur; by combining a greater number of counts of the same species/population in a trend analysis, the robustness of the trend increases as stochastic errors are averaged.

Trends should be based on a representative sample of the population and can also be based on measurements of relative abundance. National trends can be combined into flyway trends using weighting based on a comparison of national population size estimates (c.f. Pan-European Common Bird Monitoring Scheme, PECBMS,[35]method).

National- or flyway-level population size estimates should ideally be updated not less frequently than every six years. In general, it is not necessary to update them annually, apart from some particular cases such as populations that are subject to adaptive harvest management, where frequent estimates reduce the risk of setting inappropriate harvest quotas. In all other cases, when population size estimates would require full censuses with complementary sampling, significant cost savings could be achieved by undertaking periodic population size estimates. The six-year cycle is recommended, in order to fit the reporting cycles under AEWA and the EU Birds Directive (see below).

The frequency of site monitoring is dictated, on the one hand, by the data requirements of site designation and, after designation, ongoing management processes, and also by the ecology and phenology of the species' present at the site. Ideally, prior to designation, key sites should be surveyed on multiple occasions over a period of years, timed to reflect the (potential) presence of their (likely) qualifying species. Post-designation, monitoring cycles will be partly dictated by the species for which the site is protected, but key sites typically support important numbers of non-qualifying species and monitoring programmes also need to address data requirements for these species.

If the monitoring is undertaken by local volunteers or by staff of the management authority, it is usually easier and more motivating for them to repeat surveys on a more regular (monthly/annually) basis than 'turning them on and off' at infrequent periods; this will also build a better knowledge of the sites and thus lead to higher quality assessments. Monthly counts should provide robust data on the seasonal use of key sites. If monthly monitoring is not possible, select one or two months during each season.

At stop-over sites, carry out counts during both the spring (usually April-May) and the autumn (usually August - November) when most qualifying species are likely to reach their seasonal peak numbers[36]. Although it is very useful to identify such months for optimum migration counts at a national scale, it is not necessary to

[35] See point 2.2 at https://pecbms.info/methods/pecbms-methods/
[36] Examples from some countries:
https://www.dropbox.com/s/qmdugaes17wa9nu/Frequency%20distribution%20showing%20the%20number%20of%20waterbird%20species%20that%20reach%20their%20seasonal%20maximum.docx?dl=0

coordinate these internationally (unless the population size or trend is monitored using such migration counts[37]).

4.4.3 Alignment with reporting cycles

It is very beneficial for monitoring programmes to align their surveys and reporting to established international reporting cycles[38], such as:

- the AEWA Conservation Status Report (every 3 years);
- EU Birds Directive Article 12 report (every 6 years); and
- Waterbird Population Estimates and updates of international 1% thresholds for the application of Ramsar Criterion 6 (9 years based on Ramsar Resolution IX.2[39]).

Aligning survey outputs to these international reporting cycles means that the most up-to-date data are available to inform decisions about conservation and management priorities. One way to maximise the efficiency of this is to stagger the organisation of different major surveys, in order to maximise synergies and thus to minimise competition for funding. The schedule for this needs to be agreed by the AEWA Technical Committee in consultation with Contracting Parties and expert networks such as the African-Eurasian Waterbird Monitoring Partnership and other policy instruments such as the EU Birds Directive.

Concerning sites, Contracting Parties to the Ramsar Convention have committed to provide updated Ramsar Site Information Sheets for all of their designated Ramsar sites no later than every six years or on the occasion of any significant change in the sites' ecological character[40]. This also includes population size estimates for at least the waterbird populations that qualify the Ramsar site.

EU Member States are also obliged to provide up-to-date documentation of all Natura 2000 sites, including the Special Protection Areas designated under the EU Birds Directive and the status of the bird species they are designated for. Updating the Natura 2000 Standard Data Forms is regarded as a continuous process[41] and reporting on the proportion of national populations in the SPA network is part of the Article 12 reporting.

Regular reviews of site networks are important to (re)assess their adequacy for the conservation of waterbird species in the face of management challenges and changing circumstances. Such reviews form an important element of the adaptive management of the site network. A good example for such a regular review process is the three reviews of the UK SPA network[42].

Objective 3 of the AEWA Strategic Plan 2019-2027[43] foresees a process whereby AEWA Contracting Parties confirm their nationally and internationally important sites for waterbird populations listed by AEWA at MOP8 (due in 2021) and they update the information for these sites by MOP10 (due in 2027) and by every other MOP (currently a 6-yearly cycle) thereafter. By MOP9 they are also expected to report on the status, threats to and the effectiveness of conservation measures at these sites.

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[37] This is only true for a small number of species and in such cases; it is recommended that surveys are carried out during the full migration season.

[38] https://docs.google.com/spreadsheets/d/1Xq6AArQlaZUzofVbyexd6byZWBr5qDZtn2Q6BkCAPqA/edit?usp=sharing

[39] Operative Paragraph 116 "... in line with Resolution VI.4 that 1% thresholds should not be revised more frequently than every third COP (unless populations are previously poorly known or are known to be changing rapidly)."

[40] https://www.ramsar.org/sites/default/files/documents/pdf/res/key_res_vi.13e.pdf

[41] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32011D0484&from=EN

[42] http://jncc.defra.gov.uk/page-7307

[43] https://www.unep-aewa.org/sites/default/files/basic_page_documents/aewa_strategic_plan_2019-2027_final.pdf

4.5 Basic statistics for status assessment

This section assumes that appropriate statistics have already been applied to convert raw count data into estimates taking into account detectability, etc. Introductions to such methods are available in Greenwood & Robinson (2006)[44], Bibby et al. (2012)[45] and further references[46] and links to software[47] can be found on the European Bird Census Council (EBCC) website.

Whether population size is to be estimated based on a total count or a sample survey determines the site selection process and the statistical procedures to be applied. However, a total count is rarely possible, even in the case of congregatory species, because a (significant) proportion of the population might be found outside of the known wintering sites or colonies. Therefore, often a combination of the two methods should be applied, i.e. a total count of the key concentrations (wintering sites or colonies) or all known sites, and a sample survey outside of these areas to estimate the numbers that occur elsewhere.

4.5.1 Population size estimation

This is one of the fundamental attributes used to assess the status of a flyway population. However, the size of waterbird populations are constantly changing at site, national and flyway levels, yet population size estimates are usually only taken periodically. Therefore, it is important to use metrics that provide the best characterisation of the population size until the next assessment. If the population is fluctuating, the best characterisation of the 'current' population size is to present the five-year mean population estimate +/- the 95% confidence intervals (if a sufficient number of annual surveys have taken place). In the case of clearly increasing or decreasing populations, the five-year mean would be a biased characterisation of the 'current' population size, therefore the five-year maximum or minimum is used, respectively. When the population estimate is not based on yearly counts, but only minimum and maximum estimates are available, the geometric mean of these two values is used because it provides a more robust estimate of the population size than the arithmetic mean would.

In most censuses, usually not all sites or count units are counted during every survey. Therefore, the count totals do not represent the true totals even for the sites that have been surveyed. In such situations, the number of birds in count areas not surveyed need to be imputed (i.e. estimated). Estimated totals include both the counted and the imputed values and can be based on: (i) simply the five-year mean at each site, (ii) calculating the Underhill index, (iii) using TRIM[48] or (iv) more complex statistics. In most cases, even the estimated totals with imputed values are smaller than the size of the true population size because there are likely to be other occupied areas that are not counted. To estimate the population size (that can be very substantial), complementary surveys are needed to estimate the number of individuals outside of the regularly counted site network.

In the case of sampling, point estimates with confidence intervals can be produced depending on the sampling design. For further guidance, refer to Greenwood & Robinson (2006)[49].

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[44] https://play.google.com/store/books/details/William_J_Sutherland_Ecological_Census_Techniques?id=rTJdia64ACMC

[45] https://play.google.com/store/books/details/Colin_J_Bibby_Bird_Census_Techniques?id=5TqfwEHCVuoC

[46] https://www.ebcc.info/useful-reading/

[47] https://pecbms.info/methods/software/

[48] https://pecbms.info/methods/software/trim/

[49] https://play.google.com/store/books/details/William_J_Sutherland_Ecological_Census_Techniques?id=rTJdia64ACMC

Estimates of abundance can also be made, and used to validate more traditional methods, using marking studies and re-encounters of marked birds, e.g. Alisauskas et al. (2013). These methods might be particularly important in case of huntable species in areas with limited number of observers because bands could be gathered from the hunters (e.g. in Central and Southwest Asia).

4.5.2 Population trend estimation

Description of the direction and rate of change in population size (i.e. trend) is the other fundamental attribute used to assess the status of a species or population at site, national or flyway scales. However, both the length of the trend period and the trend classification depends on the purpose of the analysis and data availability.

Trend periods can be:

(i) A fixed moving time period (typically the last 5, 10 or 25 years) used to characterise the current or long-term trend. The current trends can be used as an early warning, while the long-term trends are less influenced by short-term fluctuations. This makes them more robust but also less sensitive. The long-term trend could indicate a problem too late if a population may have recovered historically but then declined again.

(ii) Linked to some policy-relevant benchmark, e.g. 1980 is used for the EU Article 12 reporting as this is the first full year after the Birds Directive came into force. The year of designation of a protected area can be used to assess whether the site still holds the numbers it has been designated for.

(iii) Trend over "10 years or 3 generations, whichever is the longer" is used by both the IUCN Red List and for the classification of populations on AEWA Table 1.

The rate of change is often compared to certain pre-set values, either to classify the trend or to use it in alert or trigger systems based on its value and the width of its confidence intervals. Again, the appropriate thresholds for rates of change in such alert systems depend on the policy context for how the trend data are used:

(i) Most national monitoring schemes use the ±5% thresholds to classify trends as strongly increasing, strongly decreasing, stable or uncertain and this is the standard setting also in the TRIM and the TrendSpotter[50] applications.

(ii) The EU Article 12 reporting and the European Red List of Birds apply the '10% decline over 10 years or 3 generations' criterion for classifying species as Declining and '30% decline over 10 years or 3 generations' for Vulnerable. AEWA uses the same thresholds to define populations in long-term decline or in rapid short-term decline and to list them accordingly on Table 1 of the AEWA Action Plan.

It is also important to note that, all else being equal, the shorter the time period for the trend analysis, the wider the confidence intervals will be, which results in an increasing number of statistically uncertain trends. This means that 5- and 10-year trends will be statistically significant only when there has been a very rapid change.

In the case of a single site, the overall trend can be described by converting the counts to a logarithmic scale and regressing a linear trend over the data. The slope of the regression line will describe the average rate of change over the time period used. If the purpose is to detect changes in trend, then fitting a moving three-year average might be more appropriate.

In the case of trends for a network of sites, generalised linear models or generalised additive models are used more frequently and there are specialised software packages and R-codes available specifically to analyse

[50] https://link.springer.com/article/10.1007/s10336-007-0176-7 (Request a copy from the authors of the article)

trends from monitoring data. The TRIM package is suitable when there is only one count per year (e.g. breeding numbers, January waterbirds counts); the TrendSpotter package is able to take into account more than one count per year (e.g. monthly waterbird counts).

4.6 Monitoring vital rates and population structure

Understanding the demographic drivers (i.e. the vital rates of productivity and survival) of population change can provide important knowledge for the recovery and sustainable management of populations. Some degree of demographic knowledge is crucial for the implementation of adaptive management of huntable waterbird populations. Furthermore, changes in population dynamics are sensitive to environmental changes and can therefore often provide early warning of likely population decline, particularly in the case of long-lived species with a large cohort of non-breeding individuals (e.g. seabirds).

Measuring of vital rates requires considerable additional effort above that required for waterbird counting but will increase the understanding of population processes substantially. However, it remains extremely challenging to sustain demographic monitoring for all waterbird species so careful consideration of priorities, alongside collaboration and coordination of data collection and analysis, is needed, in order to maximise its effectiveness and to make a clear destinction between on-off research and regular monitoring.

Species for which it is most strategic to set up demographic monitoring schemes include:

- model populations for habitat types / ecology – ecological status indicators;
- huntable species – adaptive harvest management, including bag statistics;
- action plan species – linked to outcome indicators (e.g. increasing survival or reproduction).

4.6.1. Productivity

Productivity (sometimes referred to as breeding success) is the reproductive output of the population – the number of new individuals added to the population each breeding season. Various measures of this can be made, such as clutch size, fledging success, the proportion of young birds in non-breeding flocks, or rates of recruitment into breeding populations.

Two main approaches can be applied: (i) studies during the nesting period before young birds have fledged, or (ii) studies of the population age structure during the non-breeding period.

Studies during the nesting period are typically applied to colonial-breeding species, such as herons, gulls and terns. Further guidance on how to undertake such studies is available in Koffiberg et al. (2011)[51] and in Appendix 1.

Population age structure during the non-breeding period can be applied to any species where the young birds can be readily separated in the field from adult birds, and where the various biases (see below) that affect sampling protocols are understood. Such data can be used to calculate life cycle parameters (see an example in Pettifor et al., 1998[52]).

[51] https://waddensea-worldheritage.org/resources/manual-monitoring-breeding-success-coastal-breeding-birds
[52] on page 149 at http://www2.humboldt.edu/wildlife/faculty/black/pdf/Skrifter200.pdf

This is most easily undertaken in species that form non-breeding flocks of both adults and young birds, e.g. swans[53], geese[54,55] and cranes. However, some species where the young can be easily identified do not remain in family groups, e.g. many waders. This introduces new potential biases as there is a need to sample the adult and young cohorts separately. Guidance on this has been published regularly by the International Wader Study Group[56], e.g. Robinson et al. (2005)[57], Gunnarsson (2006)[58].

In some species, it is possible to separate young from adults in the field in only one sex, usually males, e.g. Eurasian Wigeon, Long-tailed Duck. In the case of the Wigeon, data can be collected by scanning non-breeding flocks, whereas in species like the Long-tailed Duck and Common Goldeneye, data can only be collected by analysing photographs of flying flocks.

In addition, in some species where families remain together during the non-breeding season, e.g. swans, geese and cranes, the number of young in individual families can be recorded and used to calculate a mean family size. Although true mean family size cannot be calculated because it is not possible to separate pairs of birds with no young from pairs that did not attempt to breed, this method still provides a useful characterisation of the reproductive output of the population. There are also potential biases to take account of, and it is also important to consider the timing of hunting seasons for huntable species, as in most species the young are more susceptible to hunting mortality than the adults.

All of these studies should be aligned with existing schemes, so they follow standardised methods and are well coordinated across the flyway.

Biases that need to be taken into account when designing sampling protocols include:

- Differential distribution of age classes, e.g. smaller flocks of geese tend to have a greater proportion of family groups, and within an individual flock, a greater proportion of family groups is found around the edge of the flock (this is due to the high dominance ranking family groups have), young and adult shorebirds migrate at different times;
- Similar differential distribution of sexes can occur, e.g. many male ducks spend the non-breeding season at higher latitudes than females.

Many other waterbirds cannot be aged in the field after fledging. Therefore, assessing productivity is measured as the number of hatchlings or fledglings[59] and the only way of collecting these data is by capturing them as part of ringing or banding studies. These important studies are outside the scope of these guidelines, but much guidance exists elsewhere.

4.6.2. Survival

There are many studies, mainly in the temperate zones, where birds are trapped and marked with metal rings and, increasingly, also coloured leg rings, neck collars or similar conspicuous individual marks. These studies

[53] https://monitoring.wwt.org.uk/wp-content/uploads/2015/12/Whooper-Bewicks-age-assessment-methodology.pdf
[54] http://iwc.wetlands.org/static/files/Productivity%20of%20swans%20and%20geese.pdf
[55] https://monitoring.wwt.org.uk/our-work/goose-swan-monitoring-programme/breeding-success/
[56] http://www.waderstudygroup.org/
[57] https://core.ac.uk/download/pdf/148195079.pdf
[58] https://www.hi.is/sites/default/files/mas/pdf/wsg_age_props.pdf
[59] http://iwc.wetlands.org/static/files/Tern%20productivity.pdf,
http://iwc.wetlands.org/static/files/Gull%20populations.pdf,
http://iwc.wetlands.org/static/files/Dabbling%20and%20diving%20ducks.pdf

yield information about the movements of birds, and resighting data can be used to estimate survival (e.g. Clausen et al. 2001, Kraan et al. 2010, van der Jeugd et al. 2014, White & Burnham 1999[60]).

It is essential that colour-mark studies are well coordinated so that individual colour ring codes are not duplicated. In many cases, coordinators are appointed for particular species or groups of species, such as the International Wader Study Group (for waders) or the Goose Specialist Group (for geese). Further, there are online applications that also assist in project coordination by providing contact details for coordinators, as well as facilitating the reporting of sightings of marked birds and the coordinated use of these data by researchers (e.g. www.cr-birding.org and www.geese.org).

Waterbird counters are well placed to look out for colour-marked birds and so it is important to make sure they are aware of the importance of recording and reporting any sightings they make.

4.6.3 Population structure

Other aspects of population structure can also usefully enhance conservation and management activities. One common aspect of population structure that can be monitored in species that show sexual dimorphism is the adult sex ratio (ASR), i.e. the proportion of males and females within the population. Such information can be readily collected for species with clumped non-breeding distributions, such as most ducks.

Studies indicate that ASR in birds is typically skewed towards male predominance and that this arises from higher female mortality rather than skewed offspring sex ratio. ASR is significantly more severe in populations of globally threatened species which has profound implications for their monitoring and conservation. Further details can be found in Donald (2007)[61].

Given this, and the relative ease with which sex ratio data can be collected, it is highly advantageous for national monitoring programmes to collect such data where possible. Skewed sex ratio can point to e.g. higher mortality of females due to predation on nests.

4.7 Monitoring site condition

Monitoring of environmental conditions at sites where waterbird counts are undertaken is highly desirable, particularly at nationally and internationally important sites, as such information can support effective site management for waterbirds. It therefore underpins the implementation of Target 3.2 of the new AEWA Strategic Plan 2019-2027 that aims to assess the (i) status of, (ii) threats to, and (iii) effectiveness of conservation measures implemented at flyway network sites are being assessed at a flyway scale using data provided by the Contracting Parties.

Collection of such data can require significant investment of time on behalf of the counter, so it is generally not carried out annually and may require separate visits to the site or the use of other methods.

Although there are a number of existing schemes, each with their own methods, there is currently no established internationally standardised method for site condition monitoring.

Existing guidelines that are available include:

- BirdLife International's Important Bird and Biodiversity Areas[62]

[60] https://www.tandfonline.com/doi/abs/10.1080/00063659909477239
[61] https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1474-919X.2007.00724.x
[62] http://datazone.birdlife.org/userfiles/file/IBAs/MonitoringPDFs/IBA_Monitoring_Framework.pdf

- Natura 2000 Standard Data Form[63]
- Ramsar Site Information Service[64]
- Wadden Sea Flyway Initiative[65]

4.8 Integration of different considerations

Box 1 and Figure 5 help synthesising the considerations above into a coherent national monitoring programme that can contribute to both site, national and flyway level management.

[63] https://bd.eionet.europa.eu/activities/Natura_2000/reference_portal
[64] https://www.ramsar.org/sites/default/files/documents/pdf/cop11/res/cop11-res08-e-anx1.pdf
[65] http://iwc.wetlands.org/static/files/2-Guidelines_environmental%20monitoring%20Eng.pdf
http://iwc.wetlands.org/static/files/2-Form_environmental_monitoring_EA_Flyway.xlsx

Box 1. Questions to assist the development of national monitoring schemes that can support site-, national and flyway-level objectives

1. What are the regularly occurring waterbird species in our country?
2. When do these populations occur in your country in significant numbers (e.g. larger than 1% of the flyway/biogeographic population if national population size is known)?
    a. Which populations breed in your country?
    b. Which populations occur on migration and when is the usual peak time of their migration through our country?
    c. Which Palearctic migrant populations occur in northern winter and which Afrotropical species occur in their non-breeding season?
3. Does the country hold a significant proportion of the population in the season recommended for estimating the population size?
4. If so, what is the internationally recommended method for population size estimate for each of the population defined in Question 3?
5. Does the country hold a significant proportion of the population in the season recommended for estimating the population trend?
6. If so, what is the internationally recommended method for the population trend estimate for each of the populations defined in Question 5?
7. Can the national population size be estimated in the other seasons, when the country supports a significant proportion of the population, through a generic monitoring method?
8. Can the national population trend be estimated in the other seasons, when the country supports a significant proportion of the population, through a generic monitoring method?
9. If the national population size or trend cannot be estimated through a generic monitoring method, what is the conservation and management importance of the population [1]?
    a. Does the population belong to a globally threatened species?
    b. Is the species subject of an international or national species action or management plan?
    c. Is the population protected under international law (e.g. CMS Appendix I, Bern Convention Appendix I, AEWA Table 1 Column A, EU Birds Directive Annex I and Annex II)?
    d. Is the species protected under national legislation?
    e. Is the species subject of harvest?
10. What are the appropriate special methods to monitor the populations prioritised based on Question 9?
11. Is demographic monitoring (sex ratio, adult-juvenile ratio, survival) necessary for any of the populations because of
    a. Being subject of an action or management plan?
    b. Being harvested?
    c. Acting as an indicator species for certain habitat types or ecological processes?
12. Are there (potentially) any nationally or internationally important sites for any of the populations listed under Question 2.
13. For each site and population combination identify the seasonal occurrence at the site and the appropriate monitoring method and adequate timing? Best to draw up a list of qualifying species and methods per site.
14. How habitat and land use are changing at each site?
15. What are the key potential threats to the qualifying species?
16. How these potential threats can be monitored through desk studies (e.g. impact assessment procedures), remote sensing or field observations integrated with the monitoring visits?

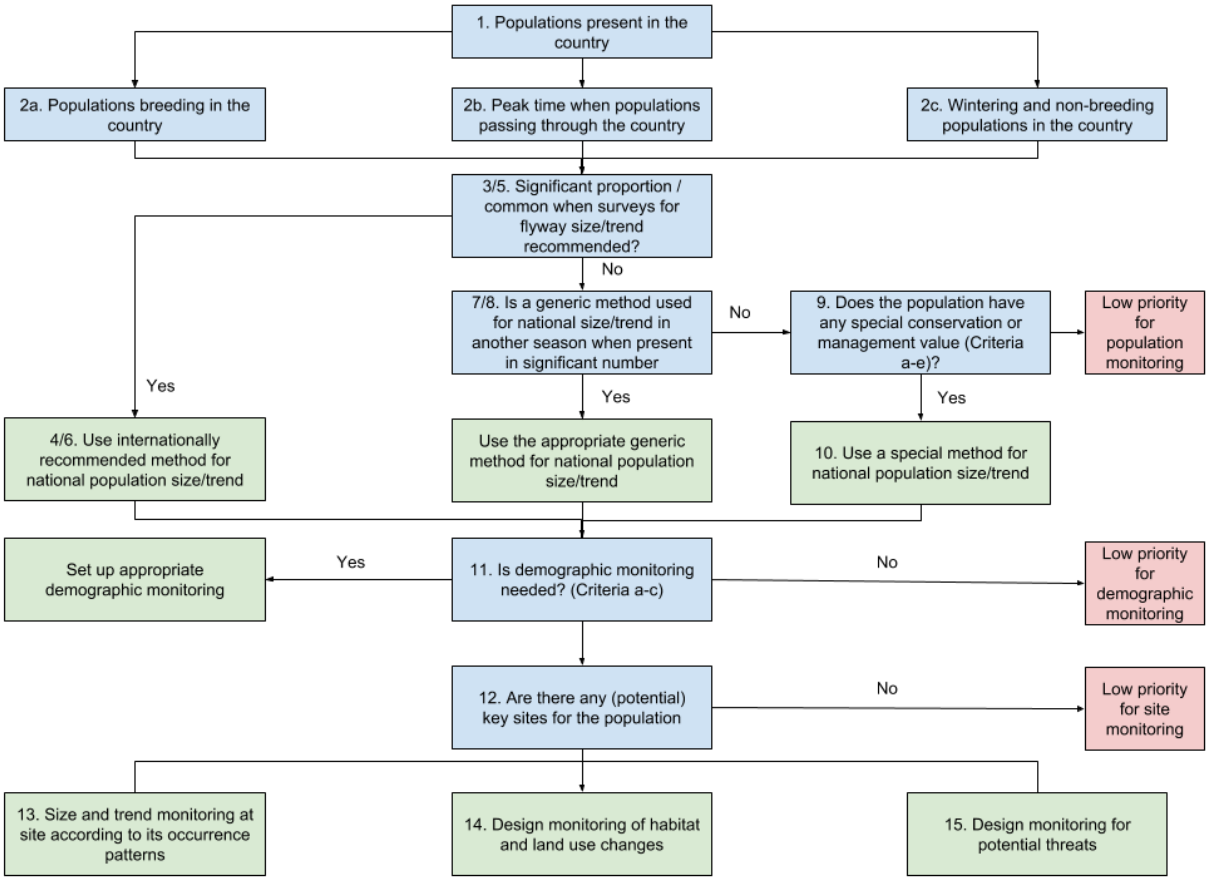

Figure 5. Flowchart of the decisions presented in Box 1 to evaluate the monitoring needs of each population occurring in a country. Questions related to population size (3, 4 and 7) and trend (5, 6 and 8) are combined, but should be assessed separately for both in case of each populations

5. Coordination and management

Monitoring in most countries, apart from the smallest ones, requires collecting data from many sites. Because of the large number of sites to be visited, visiting all these sites annually or even several times a year is usually not feasible without the effective engagement and coordination of large counter networks. This section provides guidance on the practical measures needed to manage and implement a national waterbird monitoring programme.

5.1 Coordination and liaison

Effective coordination and liaison is crucial to all waterbird monitoring activities, whether it is a broad multi-species annual survey, such as the IWC, or an occasional species-specific survey, such as the International Greenland Barnacle Goose Census, which is conducted every five years and involves surveys in just two countries (the United Kingdom and Ireland).

Coordination amongst different schemes helps to develop a programmatic approach to bird monitoring, avoid the duplication of effort, avoid overloading the counter network with requests, make possible the combining of skill sets and resources, fill gaps and ensure organisational engagement. National (water)bird monitoring committees provide a good institutional platform for such coordination. Multi-organisational partnerships,

such as the Wetland Bird Survey (WeBS) in the United Kingdom, are excellent platforms for sharing of costs and thus building a scheme that is larger than any single organisation could resource.

Scheme coordination helps to maintain networks of counters, ensure the implementation of standardised methods, the collation and sharing of data and analysis and the reporting of results at different scales and for different stakeholders.

This requires a lead coordinator who can liaise with a hierarchical network of international, national, regional and site coordinators:

- International coordinator liaises with national coordinators and manages a dataset used for international analysis and reporting;
- National coordinator manages the census and network, maintains the master national dataset, sometimes with the assistance of regional coordinators, and liaises with the international coordinator;
- Regional coordinators manage the implementation of the survey at a number of sites in a given area and liaise with the national coordinator;
- At large sites, counters might be organised into teams with a site coordinator who reports to the regional or national coordinator;
- Counters undertake surveys and liaise with regional or national coordinators.

Typically, international and national coordinators are professional staff based at a relevant organisation or government department. Regional and site coordinators and counters vary according to the national circumstances or the needs of the census; in western Europe multi-species surveys are usually undertaken by volunteers, whereas more specialised surveys (e.g. aerial surveys) are most likely to be undertaken by professional surveyors. In other countries, multi-species surveys are more likely to be undertaken by professional staff, such as managers of protected sites.

This hierarchical approach helps to manage data flows effectively (which generally operates from bottom to top) and the effective top-down cascade of survey information, including survey dates and counter feedback. It is essential that coordinators possess good organisational skills and the necessary time and resources to support the network.

Coordination is also required at strategic and development levels, e.g., national schemes are often supported by a steering committee consisting of the funders and other stakeholders and internationally the African-Eurasian Waterbird Monitoring Partnership's Strategic Working Group oversees the strategic development and implementation of the IWC and other monitoring programmes.

5.2 Building and sustaining counter networks

5.2.1 Building counter networks

Building counter networks takes time and considerable effort and is dependent upon suitable people being available and able to participate. In most western European countries, there are many skilled people who participate in recreational bird watching, and many of these support monitoring schemes as volunteers.

In many other countries, e.g. parts of Africa, Eastern Europe and Central Asia, there are currently far fewer recreational bird watchers, meaning there is insufficient capacity to build an extensive volunteer network. In such countries, it is more important to work with largely professional networks, such as people that routinely

visit wetlands for other purposes, e.g. nature reserve managers and hunting inspectors. Recruitment can still be a challenge, as national programme coordinators may need to liaise with both the individual and their employer, but this situation is potentially advantageous if carrying out waterbird surveys is something that becomes a routine part of the annual duties of relevant staff.

In some countries, intensive surveys are carried out occasionally using volunteers from other countries to augment existing counter networks. This approach has worked well in many West African countries during the coordinated surveys organised by the Wadden Sea Flyway Initiative (e.g. van Roomen et al. 2015).

5.2.2 Training and assessment

In order to maintain high quality datasets, it is important that counter networks are sufficiently skilled, so they are able to undertake surveys to a high standard. Key skills and knowledge that counters require include:

- Bird detection and identification;
- Accurate estimation of large numbers of birds;
- How to implement the survey method; and
- How to collate and submit data.

If possible, an assessment of the skills and knowledge of a counter should be undertaken before they participate in a survey. Typically, this is undertaken informally by a regional coordinator who knows the counters personally and what surveys their skills and knowledge are suitable for. In situations where regional coordinators are not available, national coordinators are usually reliant on self-assessment by the counter and the provision of training opportunities or materials.

Training can be made available in a number of different ways, including:

- Courses[66];
- Written guidance[67, 68];
- Online tools[69, 70];
- Videos; and
- Mentoring.

In countries where volunteer networks are harder to develop, training for monitoring activities can also be incorporated into wider training of, e.g. reserve managers, or even university/college curricula.

Training of coordinators and trainers might also be required, and some specific guidance is available, e.g. Hecker (2015)[71].

[66] https://www.bto.org/news-events/training
[67] http://cwac.adu.org.za/forms.php
[68] https://www.birdwatchireland.ie/LinkClick.aspx?fileticket=Ih2CTtw9bjs=&tabid=112
[69] https://wildlifecounts.com/
[70] https://www.fws.gov/waterfowlsurveys/forms/countingtest.jsp?menu=counting.test
[71] Available at: https://www.medwaterbirds.net/doc/CD2015_EN_SA_Waterbird_Training_Course_for_Sub-Saharan_Africa-2015.pdf

Mentoring typically takes the form of inexperienced potential counters accompanying experienced counters on surveys to learn the necessary field skills.

5.2.3 Engagement and motivation

In order to sustain an active and motivated counter network it is important to proactively engage with the network of coordinators and counters, regardless of whether they are volunteers or professional staff, in order to ensure that they understand how important is their participation and what they are contributing towards, that they feel valued and are happy and safe in what they are doing, and that they are motivated to continue their participation.

The types of information that should be communicated includes:

- prompt feedback on progress with and the results of surveys;
- advance notice about forthcoming survey plans (depending on the survey, preparation time can vary from a few months to more than a year);
- clear information on vacant sites;
- acknowledgements of individual and group contributions;
- key outcomes of broader conservation activities that the monitoring is supporting.

Such information can be disseminated through newsletters, reports, websites, social media and direct individual correspondence from national and/or regional organisers. Counter conferences can also be useful for motivating counters, although often only a small proportion of counters are able to attend.

Things to be aware of:

- Time constraints – the more time required, the fewer volunteers will want to take part (compared to professionals who will be getting paid for their time). Restrictions due to other commitments.

5.3 Survey protocols

All monitoring schemes require a set of protocols that instruct each level within the network (from counter to international coordinator) what is required in relation to each aspect of the scheme (from undertaking the count to reporting on and disseminating the data). Protocols should be written such that they do not need to be frequently updated, but they should be reviewed occasionally to ensure they remain accurate and relevant.

5.3.1 Survey protocols

For all surveys there is a requirement to ensure that counters know what to do. This requires information that is specific to the survey, and also generic information about the following aspects:

- What to record - provide information on the details that the observer needs to record, including any supplementary information, e.g. counts including how to record zero counts and species present but not counted;
- How to record - explain how the counter should record the data during the count (e.g. what to record in notebook or on a Dictaphone);
- Where to record - defining count areas and ensuring the counter is aware of the need to record coverage;

- About the site - provide details of how to visit the site (e.g. access route, vantage points, bird flightlines);
- Site conditions - provide information on the most suitable site conditions and what to do if the conditions are or become unsuitable (e.g. dry wetlands, tidal areas);
- Light and weather conditions - provide information on the suitable conditions under which counts should be carried out, and what to do if the conditions are or become unsuitable;
- Equipment - specify what equipment is needed to undertake the survey (some equipment may require additional information, e.g. how to record GPS tracks);
- Safety and comfort - provide guidance and information on what to do in an emergency;
- Recording effort - relevant to Capture-Mark-Recapture (CMR) studies for estimating population size;
- Submitting data - provide details of how to submit data.

Examples of specific multi-species survey protocols can be accessed via the information in Appendix 1. Further species-specific protocols can be found in Gilbert et al. (2011)[72] and it is a good practice to make these easily available also in other countries (e.g. Sovon presents all relevant methods for each species on their species information pages, in Dutch)[73].

5.3.2 Scheme management protocols

It is good practice to ensure that key coordination tasks are defined and documented so that it is clear what the key responsibilities are for site, regional, national and international organisers and to ensure that at times when the person performing these roles changes, handover is smooth, and the organisation of the monitoring programme is not interrupted[74].

Issues that survey organisation protocols should cover include:

- Roles and responsibilities of key personnel, e.g. the national coordinator, regional coordinators;
- Data management
    - Data collation, validation and reporting protocols;
- Count unit management
    - Count unit coverage prioritisation
    - Count unit boundary mapping[75]
    - Count unit protocols (e.g. access, backup coverage plan)[76]
    - Count unit allocation to observers;
- Data analysis;
- Data reporting;
- Key deadlines for the monitoring cycle;

[72] https://rbbp.org.uk/bird-monitoring-methods/
[73] https://stats.sovon.nl/
[74] http://data.prbo.org/apps/pfss/uploads/Reports/CoastalCalifornia_ShorebirdMonitoringPlan_Reiteretal_v1.0.pdf
[75] https://europe.wetlands.org/wp-content/uploads/sites/3/2016/08/Digitising-Site-Boundaries-.pdf
[76] https://www.dropbox.com/s/5625rgd1sfsnha5/Site%20Protocols%20for%20monitoring%20%20waterbirds%20in%20West%20Africa_25042013.docx?dl=0

- Procedures for learning-by-doing, including formal processes to review every element of the scheme to continuously improve it.

Further guidance and recommended reading

van Roomen M., Delany S., Dodman T., Fishpool L., Nagy S., Ajagbe A., Citegetse G. & Ndiaye A. 2014. Waterbird and site monitoring along the Atlantic coast of Africa: strategy and manual. BirdLife International, Cambridge, United Kingdom, Common Wadden Sea Secretariat, Wilhelmshaven, Germany, and Wetlands International, Wageningen, The Netherlands.
https://www.waddensea-worldheritage.org/resources/integrated-monitoring-coastal-waterbird-populations-along-east-atlantic-flyway

UK National Biodiversity Network Guidance:

- Engaging with volunteers: setting up and managing volunteer networks https://environmentdata.org/sites/default/files/NBN%20Volunteers%20Handbook.pdf
- Running a biological recording scheme or survey https://environmentdata.org/sites/default/files/Running%20a%20Biological%20Recording%20Survey%20or%20Scheme.pdf
- Running a biological recroding scheme or survey (fancy version) https://nbn.org.uk/wp-content/uploads/2016/02/NBN-52-Bio-Recording-web.pdf
- Improving wildlife data quality https://nbn.org.uk/wp-content/uploads/2016/02/NBN-Imp-Wildlife-Data-Quality-web.pdf

BirdLife International/RSPB. Guidelines for the development of bird population monitoring in Africa. https://www.rspb.org.uk/globalassets/downloads/documents/conservation-projects/guidelines-for-the-development-of-bird-population-monitoring-in-africa-2.pdf

Bibby et al. 1998. Expedition Field Techniques Bird Surveys.
http://www.bio-nica.info/ALAS/pdf2.pdf

EBCC Best Practice guide for monitoring wild birds.
http://bigfiles.birdlife.cz/ebcc/BPG/BestPracticeGuide.pdf

Gregory et al. 2004. Bird census and survey techniques. https://www.ebcc.info/wp-content/uploads/2020/06/gregory-bird-census-and-survey-techniques.pdf
North American Shorebird Monitoring Plan https://www.shorebirdplan.org/wp-content/uploads/2013/01/MONITOR3.pdf

Sea Duck Joint Venture Recommendations for Monitoring Distribution, Abundance, and Trends for North American Sea Ducks
https://seaduckjv.org/wp-content/uploads/2015/01/sea_duck_monitoring_report_web1.pdf

Boere, G., & Dodman, T. (2010). *The flyway approach to the conservation and wise use of waterbirds and wetlands: A training kit, Wings Over Wetlands Project, Wetlands International and Bird Life International, Ede, The Netherlands. Electronic document*. URL: https://www.wetlands.org/publications/wings-over-wetlands-wow-project-flyway-training-kit-ftk/

6. Data storage, sharing, analysis and reporting

Monitoring schemes support the conservation and sustainable management of waterbird populations by providing policy- and management-relevant information in the format of reports. However, it is only possible to produce such reports if data are collected, stored and analysed correctly.

6.1 Assembling data and storage

Bird monitoring schemes usually involve a large number of counters (both volunteers and professional) and collect highly standardised data from a large number of sites at one or several times each year. Therefore, setting up an efficient data flow and continuously improving its efficiency is an essential component of a well-functioning monitoring scheme.

Traditionally, monitoring data were collected using paper forms, designed to ensure that all essential data are recorded and reported in the right format by the counters. The main disadvantage of paper forms is that they need to be posted by the counter and that takes some effort, time and cost. On the part of the organisers of the monitoring schemes, the submitted data have to be recorded on paper or electronic summary forms or databases. See e.g. IWC data sheet[77].

Lately, paper forms are increasingly replaced by computer files. Word or Excel files are the most frequently used file formats. Their advantage is that they can be submitted by email and well-designed Excel forms can also save time entering the data. See e.g. IWC data entry form[78].

More recently, paper forms and computer files are increasingly replaced by online forms[79] and, with the spread of smartphones, by mobile apps developed either by national monitoring organisations (like BirdTrack[80] by BTO and Avimap by Sovon) or linked to citizen science portals like BirdLasser[81], Observation.org[82], Ornitho[83] or eBird[84] working in collaboration with the national monitoring organisations. The great advantage of these is that they save data entry time for the organisers and the mobile platforms also make it possible for the counter to record the data instantly whilst in the field. Reducing the time of data entry is also a prerequisite to be able to collect data from a large number of sites more frequently (e.g. monthly).

In reality, some counters will continue to use paper forms or electronic files even if online reporting is available because they might not have access to broadband internet or are slower in picking up the use of new technology. Therefore, the coordinators of most monitoring programmes need to maintain the possibility for observations to be submitted in all formats but should also invest in training their networks to use new data capture methods. In low income countries, it might even be worth investing in providing smartphones or tablets to the counters.

Regardless of whether the data are collected through paper or electronic forms, it is very important to give clear deadlines for each stage of the data submission, i.e. for the counters, site and regional coordinators (if any), and to set a clear timeline for the production of reports. This whole process requires considerable time to manage.

[77] http://iwc.wetlands.org/static/files/South West Asia Countform.doc
[78] http://iwc.wetlands.org/static/files/IWC visit form Tanzania example.xlsx
[79] E.g. videos introducing the BTO's Wetland Bird Survey system:
https://www.youtube.com/playlist?list=PLFFgJk1PU_BNsHxnVHdiJgPB3JPnstfAR
[80] https://www.bto.org/volunteer-surveys/birdtrack/about
[81] https://www.birdlasser.com
[82] https://observation.org/info.php
[83] https://www.ornitho.de/index.php?m_id=1116&item=7
[84] https://ebird.org/home

Errors can creep in at each stage of data collation. Counters should carefully check whether they have identified and recorded each species correctly, entered the correct numbers and provided all requested information. The coordinators responsible for collating the data should check the submitted data for completeness and accuracy. Some of these data validation tasks (e.g. species or numbers) can be automated in the databases where the data are stored. Coordinators should contact counters promptly with questions about any missing information, unlikely species or numbers. This concerns also verifying and recording zero counts (i.e. when the site was either visited and no waterbirds were found or when zero counts could be reasonably assumed based on known site conditions, e.g. because the site was frozen or dried out because of drought) or missing counts (species possibly present but not reported as counted).

Traditionally, data have passed through a chain of aggregation: observers reported to site coordinators, these reported to regional coordinators, in turn, the latter then reported to the national coordinators who also reported to international schemes. The advantages of such a hierarchical system are that: (i) the data are checked and summarised at each level and (ii) all counters are closely coordinated. The disadvantage is that it takes a lot of time (often years) until the data pass through these various levels, meaning that the information loses policy relevance as time advances. Online systems can accelerate data collation but are also more prone to erroneous data entry by the observers and this can remain more easily unnoticed than in the past. Therefore, it is especially important to use data validators and to programme adequate data validation checks as well as functions to warn for missing data.

Ideally, monitoring data is stored in adequately designed databases. In its simplest form, a national database can be a well-designed but simple Excel sheet, or it can be a desktop relational database (e.g. Access, SQL, DBASE, R, etc.) or an online database. Regardless, it is essential to safely store the original data submissions and to make frequent back-ups of the database and store them at a physically separate location to the master database, in order to avoid the loss of data. Storing back-ups on the cloud can be an efficient option for organisations with good Internet connection.

Countries with more limited technical and financial capacity can benefit from the existence of citizen science portals like BirdLasser, Observation.org, Ornitho, BirdTrack or eBird. To share data for international assessments, it is important that national databases are designed in a way that it is compatible with the international one by using either the same categories or categories that correspond and can be converted to the international one unambiguously.

6.2 Data sharing

Participants of any monitoring programme effectively commit themselves to contribute their data to collectively gain a better understanding of the status of the site or the species. This is equally valid at local, national and international levels. Access to data should balance the interests of data ownership, research and conservation. It is important to ensure that data sharing motivates participation in the monitoring programme and at the same time it does not expose sensitive species to unwanted disturbance. Therefore, data managers and data users should all respect confidentiality rules and the respective national data protection legislation when designing protocols for national schemes or using data collected by these schemes.

6.3 Data analysis and reporting

Policy- and management-relevant information is generated through data analysis. In its simplest form, the data can be aggregated to present spatial and temporal patterns. Excel Pivot Tables or R can be very efficient in producing species or site totals[85].

[85] https://europe.wetlands.org/wp-content/uploads/sites/3/2016/08/Useful-Excel-functions-to-analyse-IWC-data.pdf

However, most of the monitoring schemes are based on sampling and not on full census. Therefore, population size and trend are usually estimated through statistical analyses at local, regional, national and international levels[86, 87].

Scheme-specific or national reports can be printed or published as electronic documents or websites[88]. Printed documents have the advantage of being tangible. However, this also represents extra editing, layout, printing and distribution costs and slows down the dissemination of information. In contrast, online reports can be relatively cheap and quick to produce and easier to search but are less tangible and they need dedicated effort to look up the result. The resources needed for initial set-up can also be significant (but should represent a long-term saving).

The contents of site, national or international reports should reflect the information needs of the target audience and ideally be designed with input from the national agencies supporting the schemes. Ideally, national reports should be produced annually to provide regular feedback to the supporting agencies, the counter network and other stakeholders. However, it is important to avoid reports becoming too repetitive. A good way to avoid this is to have a series of thematic focuses and to rotate these over the years.

Monitoring differs from surveillance by comparing the current status to some desired state, e.g. the abundance or trend of a species remains above a certain level (such as the Favourable Conservation Status), at a site, national or population/species levels. Alert reports can specifically focus on comparing the current situation to such targets for sites[89], but the IUCN Red List[90] and the classification of populations on AEWA Table 1 also follow similar logic and serve the functions of alert systems.

[86] https://pecbms.info/trends_2018/
[87] http://iwc.wetlands.org/index.php/aewatrends
[88] Some reports for non-breeding waterbirds from some countries:
France: https://www.lpo.fr/la-lpo-en-actions/connaissance-des-especes-sauvages/suivis-ornithologiques/oiseaux-d-eau/wetlands-international/telechargez-les-bilans-wetlands
Netherlands: https://stats.sovon.nl/static/publicaties/rap_2018-07_wavorap_2015-16-sitelr_0.pdf
Switzerland: https://www.vogelwarte.ch/fr/projets/publications?publicationId=1324
UK: https://www.bto.org/volunteer-surveys/webs/publications/webs-annual-report/online-reports
[89] UK WeBS alerts: https://www.bto.org/volunteer-surveys/webs/publications/webs-alerts/introduction.
[90] http://www.iucnredlist.org/

Appendix 1. General references to monitoring methods and techniques

Methods	Technique	Notes	Suitable for species	References and examples
Breeding				
Dispersed breeding distribution	Area count	This can be applied in case of (smaller) waterbodies and fields. It can either include totals counted per area or use territory mapping.	Ducks, grebes and divers, waders	International scheme for dispersed breeding species in Europe is the Pan-European Common Bird Monitoring Scheme (PECBMS) https://pecbms.info/ General descriptions of the territory mapping can be found in Bibby et al. (2002)[91], Gregory et al. (2004)[92] and Gibbons & Gregory (2006)[93]. http://iwc.wetlands.org/static/files/Dabbling%20and%20diving%20ducks.pdf http://iwc.wetlands.org/static/files/Waders.pdf
	Transect	This can be applied most typically in case of narrow linear waterbodies (canals, small rivers) and in large, open habitats for species in low densities	Waders	General descriptions of transects can be found in Bibby et al. (2002)[1], Gregory et al. (2004)[2] and Gibbons & Gregory (2006)[3]. Scandinavian wader monitoring: https://www.researchgate.net/publication/279245307_Large-

[91] Bibby, C. J., Burgess, N. D., Hill, D. A., & Mustoe, S. (2000). Bird census techniques. Elsevier. URL: https://books.google.nl/books?id=Ld5wkzPp49cC&printsec=frontcover&source=gbs_atb#v=onepage&q&f=false

[92] Gregory, R. D., Gibbons, D. W., & Donald, P. F. (2004). Bird census and survey techniques. *Bird ecology and conservation*, 17-56. URL: https://www.ebcc.info/wp-content/uploads/2020/06/gregory-bird-census-and-survey-techniques.pdf

[93] Gibbons, D. W., & Gregory, R. D. (2006). Birds. In: Sutherland WJ (ed.), Ecological Census Techniques: A Handbook.; ss. 308-350. URL: https://play.google.com/store/books/details/William_J_Sutherland_Ecological_Census_Techniques?id=rTJdia64ACMC

Methods	Technique	Notes	Suitable for species	References and examples
				Scale_Monitoring_of_Waders_on_Their_Boreal_and_Arctic_Breeding_Grounds_in_Northern_Europe
	Point counts	Often used in common bird monitoring schemes focusing on passerines.	Crakes (using vocalisation playback) and sometimes ducks (Finland) waders (e.g. in Norway)	General descriptions of point counts can be found in Bibby et al. (2002)[1], Gregory et al. (2004)[2] and Gibbons & Gregory (2006)[3]. Finnish point transect for ducks: https://www.luomus.fi/sites/default/files/files/04a_waterfowl_point_counts.pdf
Colonial breeding	Counts from vantage point - observation - photograph	Suitable for colonies on cliffs, or in reedbeds, that can be seen well. Aerial photographs from a plane or drone can be considered as a special form of this method.	Certain herons, storks, spoonbills, ibises, gulls, terns and auks	Relevant international groups: Circumpolar Seabird Expert Group (cBird) https://www.caff.is/seabirds-cbird/about-cbird BirdLife International's Marine Important Bird Areas Toolkit http://datazone.birdlife.org/userfiles/file/Marine/MarinetoolkitnewNew.pdf General heron monitoring methods including colony counts: https://www.heronconservation.org/wp-content/uploads/2014/12/Heron-Count-Protocols.pdf
	Ground counts - quadrats - transects	Suitable for colonies on the ground including in forest and reedbed. High risk of disturbance.	Cormorants, pelicans, certain herons, spoonbills, ibises, gulls and terns	

Methods	Technique	Notes	Suitable for species	References and examples
	Flush counts	In general, less accurate than the others but can be preferred in hot or cold areas when extended period of disturbance can lead to high egg or chick mortality	Gulls and terns, snipes	Heron monitoring in Italy: https://www.heronconservation.org/wp-content/uploads/JHBC/vol01/01_08_Fasola_et_al.pdf Red Sea seabird monitoring protocol: https://persga.org/Documents/Publications/QR_Downloads/English/SSM_May_2019.pdf (see Chapter 8) UK Seabirds Monitoring Handbook: http://jncc.defra.gov.uk/PDF/pub95_SeabirdHandbook.pdf UK Gull population monitoring protocol: http://iwc.wetlands.org/static/files/Gull%20populations.pdf UK Gull productivity protocol: http://iwc.wetlands.org/static/files/Gull%20productivity.pdf UK Tern population monitoring protocol: http://iwc.wetlands.org/static/files/Tern%20populations.pdf UK Tern productivity protocol: http://iwc.wetlands.org/static/files/Tern%20productivity.pdf

Methods	Technique	Notes	Suitable for species	References and examples
Non-breeding				
Daytime waterbird counts	Inland wetlands and high tide counts on estuarine sites	On estuarine sites, it is applicable if birds can be counted when concentrated at high tide roosts – i.e. not hidden in e.g. mangroves, amongst rocks, etc.	Multi-species – grebes, wildfowl, herons, waders, gulls	The international general scheme for waterbirds across the flyway is the African-Eurasian Waterbird Census (AEWC) https://europe.wetlands.org/our-approach/healthy-wetland-nature/african-eurasian-waterbird-census/ International guidelines https://europe.wetlands.org/wp-content/uploads/sites/3/2016/08/Protocol_for_waterbird_counting_En_.pdf https://europe.wetlands.org/wp-content/uploads/sites/3/2016/08/Protocol-for-waterbird-counting_FR_.pdf UK Wetland Bird Survey protocol: http://iwc.wetlands.org/static/files/Wetland%20Birds%20Survey%20WeBS%20Core%20Counts.pdf

Methods	Technique	Notes	Suitable for species	References and examples
	Low tide counts on estuaries	To be used if high tide counts are not possible or to understand the use of the site for feeding. Large mudflats might be impossible to count completely; in such cases smaller samples can be counted and then extrapolated.	Multi-species – grebes, waterfowl, herons, waders, gulls	UK low tide Counts protocol: http://iwc.wetlands.org/static/files/Waterfowl%20low-tide%20counts.pdf
	Non-estuarine coastline counts	Waterfowl on non-estuarine coastlines, e.g. rocky shores	Certain waders (e.g. Purple Sandpiper)	UK Non-estuarine Coastal Waterfowl Survey protocol http://iwc.wetlands.org/static/files/Waterfowl%20on%20nonestuarine%20coastlines.pdf
	Inshore counts	Shore-based counts of the inshore marine environment. Only count during flat sea states and choose vantage points well	Divers, cormorants, grebes and ducks	UK Inshore water counts protocol: http://iwc.wetlands.org/static/files/Inshore%20marine%20waterfowl.pdf Banks, A., Bolt, D., Bullock, I., Haycock, B., Musgrove, A., Newson, S., Fairney, N., Sanderson, W., Schofield, R., Smith, L., Taylor, R. and Whitehead, S. 2004. Ground and aerial monitoring protocols for inshore special protection areas: common scoter in Carmarthen Bay 2002–04. CCW Marine Monitoring Report No: 11, 155pp.

Methods	Technique	Notes	Suitable for species	References and examples
	Offshore counts	Aerial (visual (observers in plane) or digital (video or stills cameras)) or boat-based surveys of the offshore marine environment. Usually undertaken using sample method following defined transects. Some species best surveyed by plane, others by boat.	Seaducks, seabirds, divers, grebes (boat only)	UK Waterfowl and Seabirds at Sea protocol: http://iwc.wetlands.org/static/files/Waterfowl%20and%20seabirds%20at%20sea.pdf HELCOM guidelines for marine wintering birds: http://www.helcom.fi/Documents/Action%20areas/Monitoring%20and%20assessment/Manuals%20and%20Guidelines/Guidelines%20for%20monitoring%20of%20wintering%20birds.pdf Komdeur, J., J. Bertelsen & G. Cracknell (eds.) 1992. Manual for aeroplane and ship surveys of waterfowl and seabirds. IWRB Special Publication No.19. IWRB, Slimbridge, U.K. Tasker, M.L. et al. 1984. Counting seabirds at sea from ships: a review of methods employed and a suggestion for a standardised approach. Auk 101: 567-577. Camphuysen, K. J., Fox, A. D., Leopold, M. F. and Petersen, I. K. (2004) Towards standardised seabirds at sea census techniques in connection with environmental impact assessments for offshore wind farms in the U.K.: a comparison of ship and aerial sampling methods for marine birds, and their applicability to offshore wind farm assessments (PDF, 2.7 mb), NIOZ report to COWRIE (BAM – 02-2002), Texel. http://jncc.defra.gov.uk/pdf/Camphuysenetal2004_COWRIEmethods.PDF

Methods	Technique	Notes	Suitable for species	References and examples
				BirdLife International (2010). Marine Important Bird Areas toolkit: standardised techniques for identifying priority sites for the conservation of seabirds at sea. BirdLife International, Cambridge UK http://datazone.birdlife.org/userfiles/file/Marine/Marinetoolkitnew.pdf
	Daytime counts at feeding areas	Counts of an area, often following fixed route and undertaken by car	Certain geese, swans, certain grassland/farmland waders	5-yearly European Swan Census UK National Wintering Swan Census protocol: http://iwc.wetlands.org/static/files/Swans.pdf 5-yearly Coordinated European Golden Plover Counts http://www.dda-web.de/downloads/texts/publications/gillings_et_al_2012_golden_plovers_oct2012.pdf Aerial survey of geese Walsh, A & OJ Merne. 1988. Barnacle Geese Branta leucopsis in Ireland, spring 1988. *Irish Birds* 3: 539–550.

Methods	Technique	Notes	Suitable for species	References and examples
	Roost counts	Counts at dawn or dusk of species that disperse over large areas during the day but gather at communal roosts. Prior knowledge of flight lines and vantage points usually important.	Cormorants, pelicans, certain geese and ducks (e.g. Goosander, Black Duck), herons, storks, ibises, cranes, gulls and terns	UK Goose count protocols: http://iwc.wetlands.org/static/files/Geese.pdf https://monitoring.wwt.org.uk/our-work/goose-swan-monitoring-programme/
	Daytime migration count	Counts at migratory bottleneck areas for species that highly concentrate at such sites	Population size and trend of soaring birds that concentrate at a few botlenecks like Black and White Stork, Great White Pelican. It can be useful to monitor trends in certain seaducks, divers and skuas but will not yield population estimates	
	Moult counts	Usually aerial surveys of large concentrations at remote moulting areas. IT might be more suitable for site monitorig than for population monitoring.	Geese, seaducks, shelducks	Common Shelduck in the Wadden Sea https://www.waddensea-worldheritage.org/sites/default/files/2013_moulting%20shelduck.pdf

Appendix 2. Recommended monitoring methods and season for each population in the Agreement Area

Codes	Methods	Corresponding methods in Appendix 1
Breeding season		
C	Colony counts	Colonial breeding including counts from vantage points, ground counts, flush counts
D	Dispersed species surveys	Dispersed breeding distribution including area count, transect and point counts
V	Vocalisation based counts	References are given under point counts
L	List method / reporting rate	SABAP2 protocol: http://sabap2.adu.org.za/content.php?id=4
S	Other specialised breeding bird surveys	See available method descriptions in the note section at the populations
Non-breeding season		
I	Coordinated January counts of inland and inshore coastal wetlands	Inland wetlands and high tide counts on estuarine sites, low tide counts on estuarine sites, non-estuarine coastline counts, indhore counts + aerial counts might be necessary to cover large floodplains systematically
J	Coordinated July counts of inland and inshore coastal wetlands	Inland wetlands and high tide counts on estuarine sites, low tide counts on estuarine sites, non-estuarine coastline counts, indhore counts + aerial counts might be necessary to cover large floodplains systematically
G	Goose and swan counts	Daytime counts at feeding areas, roost counts
W	Non-breeding farmland wader counts	Daytime counts at feeding areas, roost counts
P	Daylight migration counts	
R	Roost counts	Roost counts
M	Counts at moulting sites	Moult counts
O	Offshore water- and seabird counts	Offshore counts

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Dendrocygna viduata	West Africa (Senegal to Chad)	1	All			I		i	
Dendrocygna viduata	Eastern & Southern Africa	1	All			J		j	
Dendrocygna viduata	Madagascar		All			J		j	
Dendrocygna bicolor	Eastern & Southern Africa	1	All			J		j	
Dendrocygna bicolor	West Africa (Senegal to Chad)	1	All			I		i	
Dendrocygna bicolor	Madagascar		All			J		j	
Thalassornis leuconotus	leuconotus, West Africa	1	All		D			i	
Thalassornis leuconotus	leuconotus, Eastern & Southern Africa	1	All		D			i & j	
Thalassornis leuconotus	insularis		All		D			i	
Oxyura maccoa	Ethiopian Highlands		All	VU	D			i	
Oxyura maccoa	Eastern Africa	1	All	VU	D			i	
Oxyura maccoa	Southern Africa	1	All	VU	D			i	
Oxyura leucocephala	West Mediterranean (Spain & Morocco)	1	All	EN	D			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Oxyura leucocephala	Algeria & Tunisia	1	All	EN	D			i	
Oxyura leucocephala	East Mediterranean, Turkey & South-west Asia	1	All	EN	D			i	
Oxyura leucocephala	South Asia (non-bre)			EN					
Cygnus olor	Ireland		All		D			i & g	
Cygnus olor	Britain		All		D			i & g	Gilbert et al. (2011) pp. 87-90
Cygnus olor	North-west Mainland & Central Europe	1	Breeding		D			i & g	
Cygnus olor	Black Sea	1	Breeding		D			i & g	
Cygnus olor	West & Central Asia/Caspian	1	Breeding		D			i & g	
Cygnus cygnus	Iceland/UK & Ireland	1	Breeding			G		g	Internationa Swan Census URL: https://monitoring.wwt.org.uk/our-work/goose-swan-monitoring-programme/abundance/isc/

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Cygnus cygnus	North-west Mainland Europe	1	None			G		g	Internationa Swan Census URL: https://monitoring.wwt.org.uk/our-work/goose-swan-monitoring-programme/abundance/isc/
Cygnus cygnus	N Europe & W Siberia/Black Sea & E Mediterranean	1	Wintering			G		g	Internationa Swan Census URL: https://monitoring.wwt.org.uk/our-work/goose-swan-monitoring-programme/abundance/isc/
Cygnus cygnus	West & Central Siberia/Caspian	1	Wintering			G		g	Internationa Swan Census URL: https://monitoring.wwt.org.uk/our-work/goose-swan-monitoring-programme/abundance/isc/
Cygnus columbianus	bewickii, Western Siberia & NE Europe/North-west Europe	1	Breeding			G		g	Internationa Swan Census URL: https://monitoring.wwt.org.uk/our-work/goose-

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
									swan-monitoring-programme/abundance/isc/
Cygnus columbianus	bewickii, Northern Siberia/Caspian	1	Breeding			G		g	Internationa Swan Census URL: https://monitoring.wwt.org.uk/our-work/goose-swan-monitoring-programme/abundance/isc/
Branta bernicla	bernicla, Western Siberia/Western Europe	1	All			G		G	
Branta bernicla	hrota, Svalbard/Denmark & UK	1	All			G		g	Demy et al (2004) URL: https://monitoring.wwt.org.uk/wp-content/uploads/2013/07/Waterbird-Review-Series-Svalbard-Light-bellied-Brent-Goose.pdf
Branta bernicla	hrota, Canada & Greenland/Ireland	1	All			G		g	All-Ireland Light Bellied Brent Goose Census URL: https://monitoring.wwt.org.uk/our-work/goose-swan-monitoring-

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
									programme/species-accounts/canadian-light-bellied-brent/
Branta leucopsis	East Greenland/Scotland & Ireland	1	All			G		g	International Census of Greenland Barnacle Goose URL: https://monitoring.wwt.org.uk/our-work/goose-swan-monitoring-programme/abundance/icgbg/
Branta leucopsis	Svalbard/South-west Scotland	1	All			G		g	Annual counts and age assessments URL: https://monitoring.wwt.org.uk/our-work/goose-swan-monitoring-programme/species-accounts/svalbard-barnacle-goose/
Branta leucopsis	Russia/Germany & Netherlands	1	All		D	G		g	AEWA European Goose Management Platform International Data Centre URL: http://egmp.aewa.info/data-centre

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
									D - Baltic and North Sea management units
Branta ruficollis	Northern Siberia/Black Sea & Caspian	1	All	VU		G		g	AEWA Red-breasted Goose IWG URL: http://www.redbreastedgoose.aewa.info/
Anser anser	anser, Iceland/UK & Ireland	1	All			G		g	Icelandic-breeding Goose Census URL: https://monitoring.wwt.org.uk/our-work/goose-swan-monitoring-programme/abundance/igc/
Anser anser	anser, Britain		Breeding		D		d		
Anser anser	anser, NW Europe/South-west Europe	1	All			G		g	AEWA European Goose Management Platform International Data Centre URL: http://egmp.aewa.info/data-centre
Anser anser	anser, Central Europe/North Africa	1	All			G		g	
Anser anser	rubrirostris, Black Sea & Turkey	1	All			G		g	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Anser anser	rubrirostris Western Siberia/Caspian & Iraq	1	All			G		g	
Anser fabalis	fabalis, North-east Europe/North-west Europe	1				G		g	AEWA European Goose Management Platform International Data Centre URL: http://egmp.aewa.info/data-centre
Anser fabalis	johanseni, West & Central Siberia/Turkmenistan to W China	1				G		g	
Anser fabalis	rossicus, West & Central Siberia/NE & SW Europe	1				G		g	
Anser brachyrhynchus	East Greenland & Iceland/UK	1	All			G		g	Icelandic-breeding Goose Census URL: https://monitoring.wwt.org.uk/our-work/goose-swan-monitoring-programme/abundance/igc/
Anser brachyrhynchus	Svalbard/North-west Europe	1	All			G		g	AEWA European Goose Management Platform

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
									International Data Centre URL: http://egmp.aewa.info/data-centre
Anser albifrons	albifrons, NW Siberia & NE Europe/North-west Europe	1	Wintering			G		g	
Anser albifrons	albifrons, Western Siberia/Central Europe	1	Wintering			G		g	
Anser albifrons	albifrons, Western Siberia/Black Sea & Turkey	1	Wintering			G		g	
Anser albifrons	albifrons, Northern Siberia/Caspian & Iraq	1	Wintering			G		g	
Anser albifrons	flavirostris, Greenland/Ireland & UK	1	All			G		g	Greenland White-fronted Goose Census URL: https://monitoring.wwt.org.uk/our-work/goose-swan-monitoring-programme/abundance/gwfc/

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Anser erythropus	NE Europe & W Siberia/Black Sea & Caspian	1	All	VU		S		g	AEWA Lesser White-fronted Goose IWG URL: http://lesserwhitefrontedgoose.aewa.info/
Anser erythropus	Fennoscandia	1	All	VU		M		g	AEWA Lesser White-fronted Goose IWG URL: http://lesserwhitefrontedgoose.aewa.info/
Clangula hyemalis	Iceland & Greenland (bre)	1	Breeding	VU		O		i	Gilbert et al. (2011) pp. 114
Clangula hyemalis	Western Siberia/North Europe (bre)	1	Breeding	VU		O		i	
Somateria spectabilis	East Greenland, NE Europe & Western Siberia	1	All?		D		c		
Somateria mollissima	mollissima, Britain, Ireland		Breeding	NT	D			i	Gilbert et al. (2011) pp. 111-113
Somateria mollissima	mollissima, Baltic, Denmark & Netherlands	1	Breeding	NT	D			i	
Somateria mollissima	mollissima, Norway & Russia	1	All	NT	D			i	
Somateria mollissima	mollissima, White Sea		All	NT	D			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Somateria mollissima	mollissima, Black Sea		All	NT	D			i	
Somateria mollissima	faeroeensis, Faeroe Is		Breeding	NT	D		c		
Somateria mollissima	faeroeensis, Shetland, Orkney Is		Breeding	NT		M	c		
Somateria mollissima	borealis, Svalbard & Franz Joseph (bre)	1	Breeding	NT	D		c		
Somateria mollissima	borealis, Iceland		Breeding	NT	D		c		
Somateria mollissima	borealis, West Greenland								
Somateria mollissima	borealis, NE Greenland		Breeding	NT	D		c		
Somateria mollissima	borealis, Arctic NE Canada		Breeding	NT	D		c		
Polysticta stelleri	Western Siberia/North-east Europe	1	Wintering	VU		O		i	
Melanitta fusca	Western Siberia & Northern Europe/NW Europe	1	All	VU		O		i	Gilbert et al. (2011) pp. 120
Melanitta fusca	Black Sea & Caspian	1	All	VU	S			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Melanitta nigra	W Siberia & N Europe/W Europe & NW Africa	1	All			O		i	Gilbert et al. (2011) pp. 115-119
Bucephala clangula	clangula, North-west & Central Europe (win)	1	Wintering			I		i	Gilbert et al. (2011) pp. 121
Bucephala clangula	clangula, North-east Europe/Adriatic	1	Wintering			I		i	
Bucephala clangula	clangula, Western Siberia & North-east Europe/Black Sea	1	Wintering			I		i	
Bucephala clangula	clangula, Western Siberia/Caspian	1	Wintering			I		i	
Bucephala islandica	Iceland		All		D			i	
Mergellus albellus	North-west & Central Europe (win)	1	Wintering			I & O		i	
Mergellus albellus	North-east Europe/Black Sea & East Mediterranean	1	Wintering			I & O		i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Mergellus albellus	Western Siberia/South-west Asia	1	Wintering			I & O		i	
Mergus merganser	merganser, North-west & Central Europe (win)	1	Wintering			I & O		i	Gilbert et al. (2011) pp. 127-132
Mergus merganser	merganser, Iceland		All		D		d		
Mergus merganser	merganser, Central west Europe (bre)		Breeding		D		d		
Mergus merganser	merganser, Balkans (bre)		Breeding		D		d		
Mergus merganser	merganser, North-east Europe/Black Sea	1	Wintering			I & O		i	
Mergus merganser	merganser, Western Siberia/Caspian	1	Wintering			I & O		i	
Mergus serrator	North-west & Central Europe (win)	1	Wintering			I & O		i	Gilbert et al. (2011) pp. 122-126
Mergus serrator	North-east Europe/Black Sea & Mediterranean	1	Wintering			I & O		i	
Mergus serrator	Western Siberia/South-west & Central Asia	1	Wintering			I & O		i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Mergus serrator	W & SE Greenland		All			I & O			
Histrionicus histrionicus	E & SW Greenland (non-bre)		All		D		L		
Histrionicus histrionicus	Iceland		All		D			i	
Alopochen aegyptiaca	West Africa	1	All		D			i	
Alopochen aegyptiaca	Eastern & Southern Africa	1	All		D			i	
Tadorna tadorna	North-west Europe	1	All?		D			i	Gilbert et al. (2011) pp. 99-102
Tadorna tadorna	Black Sea & Mediterranean	1	All?		D			i	
Tadorna tadorna	Western Asia/Caspian & Middle East	1	All		D			i	
Tadorna ferruginea	Ethiopia		All		D			i	
Tadorna ferruginea	North-west Africa	1	All		D			i	
Tadorna ferruginea	East Mediterranean & Black Sea/North-east Africa	1	All?		D			i	
Tadorna ferruginea	Western Asia & Caspian/Iran & Iraq	1	All?		D			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Tadorna cana	Southern Africa	1	All		D			i	
Plectropterus gambensis	gambensis, West Africa	1	All		D			i	
Plectropterus gambensis	gambensis, Eastern Africa (Sudan to Zambia)	1	All		D			i	
Plectropterus gambensis	niger, Southern Africa	1	All		D			j	
Sarkidiornis melanotos	West Africa	1	All		D			i	
Sarkidiornis melanotos	Southern & Eastern Africa	1	All		D			i	
Sarkidiornis melanotos	melanotos, Madagascar		All		D			i	
Nettapus auritus	West Africa	1	All		D			i	
Nettapus auritus	Southern & Eastern Africa	1	All		D			i	
Nettapus auritus	Madagascar		All		D			i	
Pteronetta hartlaubii	W Africa		All		D		L		
Pteronetta hartlaubii	W Central Africa		All		D		L		
Cyanochen cyanoptera	Ethiopia		All	VU	D			j	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Marmaronetta angustirostris	West Mediterranean/West Medit. & West Africa	1	All	VU	D			i	
Marmaronetta angustirostris	East Mediterranean	1	All	VU	D			i	
Marmaronetta angustirostris	South-west Asia	1	All	VU	D			i	
Marmaronetta angustirostris	South Asia (non-bre)								
Netta rufina	South-west & Central Europe/West Mediterranean	1	All			I		i	
Netta rufina	Black Sea & East Mediterranean	1	All			I		i	
Netta rufina	Western & Central Asia/South-west Asia	1	All			I		i	
Netta erythrophthalma	brunnea, Southern & Eastern Africa	1	All		D			i	
Aythya ferina	North-east Europe/North-west Europe	1	Winter	VU		I		i	Gilbert et al. (2011) pp. 109

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Aythya ferina	Central & NE Europe/Black Sea & Mediterranean	1	Winter	VU		I		i	
Aythya ferina	Western Siberia/South-west Asia	1	Winter	VU		I		i	
Aythya innotata	Madagascar		All	CR	S		S		
Aythya nyroca	West Mediterranean/North & West Africa	1	Breeding	NT	D		d		
Aythya nyroca	Eastern Europe/E Mediterranean & Sahelian Africa	1	Breeding	NT	D		d		
Aythya nyroca	Western Asia/SW Asia & NE Africa	1	Breeding	NT	D			i	
Aythya fuligula	North-west Europe (win)	1	Winter			I		i	
Aythya fuligula	Central Europe, Black Sea & Mediterranean (win)	1	Winter			I		i	
Aythya fuligula	Western Siberia/SW Asia & NE Africa	1	Winter			I		i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Aythya marila	marila, Northern Europe/Western Europe	1	Winter			I & O		i & o	Gilbert et al. (2011) pp. 110
Aythya marila	marila, Western Siberia/Black Sea & Caspian	1	Winter			I & O		i & o	
Spatula querquedula	Western Siberia & Europe/West Africa	1	Wintering			I		i	Gilbert et al. (2011) pp. 107
Spatula querquedula	Western Siberia/SW Asia, NE & Eastern Africa	1	Wintering			I		i	
Spatula hottentota	Lake Chad Basin	1	All		D			i	
Spatula hottentota	Eastern Africa (south to N Zambia)	1	All		D			i	
Spatula hottentota	Southern Africa (north to S Zambia)	1	All		D			i	
Spatula hottentota	Madagascar		All		D			i	
Spatula smithii	S Africa		All		D			i	
Spatula clypeata	North-west & Central Europe (win)	1	Wintering			I		i	Gilbert et al. (2011) pp. 108

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Spatula clypeata	W Siberia, NE & E Europe/S Europe & West Africa	1	Wintering			I		i	
Spatula clypeata	W Siberia/SW Asia, NE & Eastern Africa	1	Wintering			I		i	
Mareca strepera	strepera, North-west Europe	1	Wintering			I		i	Gilbert et al. (2011) pp. 104
Mareca strepera	strepera, North-east Europe/Black Sea & Mediterranean	1	Wintering			I		i	
Mareca strepera	strepera, Western Siberia/SW Asia & NE Africa	1	Wintering			I		i	
Mareca penelope	Western Siberia & NE Europe/NW Europe	1	Wintering			I & G		i & g	Gilbert et al. (2011) pp. 103
Mareca penelope	W Siberia & NE Europe/Black Sea & Mediterranean	1	Wintering			I & G		i & g	
Mareca penelope	Western Siberia/SW Asia & NE Africa	1	Wintering			I & G		i & g	
Anas sparsa	sparsa		All		D		L		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Anas sparsa	leucostigma, E Africa		All		D		L		
Anas sparsa	leucostigma, Ethiopian Highlands		All		D		L		
Anas sparsa	leucostigma, Cameroon, Nigeria		All		D		L		
Anas sparsa	leucostigma? Guinea		All		D		L		
Anas sparsa	leucostigma (maclatchyi), Gabon		All		D		L		
Anas undulata	undulata, E Africa		Breeding		D			I & j	
Anas undulata	undulata, Southern Africa	1	Breeding		D			I & j	
Anas undulata	rueppelli NE Africa		All		D			i	
Anas undulata	rueppelli? Cameroon & Nigeria		All		D			i	
Anas melleri	Madagascar		All	EN	D			j	
Anas platyrhynchos	platyrhynchos, North-west Europe	1	Wintering			I		i	
Anas platyrhynchos	platyrhynchos, Northern	1	Wintering			I		i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
	Europe/West Mediterranean								
Anas platyrhynchos	platyrhynchos, Eastern Europe/Black Sea & East Mediterranean	1	Wintering			I		i	
Anas platyrhynchos	platyrhynchos, Western Siberia/South-west Asia	1	Wintering			I		i	
Anas platyrhynchos	conboschas		All		D		L		
Anas bernieri	W Madagascar			EN	S			i	
Anas capensis	Eastern Africa (Rift Valley)	1	All		D			i	
Anas capensis	Lake Chad basin	1	All		S			i	
Anas capensis	Southern Africa (N to Angola & Zambia)	1	All		D			i	
Anas erythrorhyncha	Southern Africa	1	All		D			i	
Anas erythrorhyncha	Eastern Africa	1	All		D			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Anas erythrorhyncha	Madagascar	1	All		D			i	
Anas acuta	North-west Europe	1	Wintering			I		i	Gilbert et al. (2011) pp. 106
Anas acuta	W Siberia, NE & E Europe/S Europe & West Africa	1	Wintering			I		i	
Anas acuta	Western Siberia/SW Asia & Eastern Africa	1	Wintering			I		i	
Anas crecca	crecca, North-west Europe	1	Wintering			I		i	Gilbert et al. (2011) pp. 105
Anas crecca	crecca, W Siberia & NE Europe/Black Sea & Mediterranean	1	Wintering			I		i	
Anas crecca	crecca, Western Siberia/SW Asia & NE Africa	1	Wintering			I		i	
Tachybaptus ruficollis	ruficollis, Europe & North-west Africa	1	All		D			i	
Tachybaptus ruficollis	capensis, Sub-Saharan Africa		All		D			i	
Tachybaptus ruficollis	iraqensis		All		D			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Tachybaptus ruficollis	albescens				D			i	
Tachybaptus pelzelnii	Madagascar			VU	D			i	
Podiceps grisegena	grisegena, North-west Europe (win)	1	All		D			i	
Podiceps grisegena	grisegena, Black Sea & Mediterranean (win)	1	All		D			i	
Podiceps grisegena	grisegena, Caspian (win)	1	Wintering			I		i	
Podiceps grisegena	grisegena (balchashensis)		Wintering			I		i	
Podiceps cristatus	cristatus, North-west & Western Europe	1	All		D			i	
Podiceps cristatus	cristatus, Black Sea & Mediterranean (win)	1	All		D			i	
Podiceps cristatus	cristatus, Caspian & South-west Asia (win)	1	All		D			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Podiceps cristatus	infuscatus, Eastern Africa (Ethiopia to N Zambia)	1	All		D			i	
Podiceps cristatus	infuscatus, Southern Africa	1	All		D			i	
Podiceps auritus	auritus, North-west Europe (large-billed)	1	Breeding	VU	D		d		Gilbert et al. (2011) pp. 43-45
Podiceps auritus	auritus, North-east Europe (small-billed)	1	Breeding	VU	D		d		
Podiceps auritus	auritus, Caspian & South Asia (win)	1	All	VU	D		L		
Podiceps nigricollis	nigricollis, Europe/South & West Europe & North Africa	1	All		C			i	Gilbert et al. (2011) pp. 46-48
Podiceps nigricollis	nigricollis, Western Asia/South-west & South Asia	1	All		C			i	
Podiceps nigricollis	nigricollis, E Africa		All		C			i	
Podiceps nigricollis	gurneyi, Southern Africa	1	All		C			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Phoenicopterus roseus	Aldabra		All		C		c		
Phoenicopterus roseus	East Mediterranean	1	Breeding		C			i	
Phoenicopterus roseus	Mascarenes		All		C		c		
Phoenicopterus roseus	South-west & South Asia	1	Breeding		C			i	
Phoenicopterus roseus	West Africa	1	Breeding		C			i	
Phoenicopterus roseus	Eastern Africa	1	Breeding		C			i	
Phoenicopterus roseus	Southern Africa (to Madagascar)	1	All		C			i	
Phoenicopterus roseus	West Mediterranean	1	Breeding		C			i	
Phoeniconaias minor	West Africa	1	All	NT	C			i	
Phoeniconaias minor	Eastern Africa	1	All	NT	C			i	
Phoeniconaias minor	Southern Africa (to Madagascar)	1	All	NT	C			i	
Phaethon aethereus	aetherus, South Atlantic	1			C		c		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Phaethon aethereus	indicus, Persian Gulf, Gulf of Aden, Red Sea	1			C		c		
Phaethon rubricauda	rubricauda, Indian Ocean	1			C		c		
Phaethon lepturus	lepturus, W Indian Ocean	1			C		c		
Podica senegalensis	senegalensis		All		D		L		
Podica senegalensis	somerini		All		D		L		
Podica senegalensis	camerunensis		All		D		L		
Podica senegalensis	petersii		All		D		L		
Podica senegalensis	petersii (albipectus)		All		D		L		
Sarothrura pulchra	pulchra		All		V		L		
Sarothrura pulchra	zenkeri		All		V		L		
Sarothrura pulchra	batesi		All		V		L		
Sarothrura pulchra	centralis		All		V		L		
Sarothrura elegans	elegans, NE, Eastern & Southern Africa	1	All		V		L		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Sarothrura elegans	reichenovi, S West Africa to Central Africa	1	All		V		L		
Sarothrura rufa	bonapartii		All		V		L		
Sarothrura rufa	elizabethae		All		V		L		
Sarothrura rufa	rufa		All		V		L		
Sarothrura lugens	lugens		All		V		L		
Sarothrura lugens	lynesi		All		V		L		
Sarothrura boehmi	Central Africa	1	All		V				
Sarothrura affinis	antonii		All		V		L		
Sarothrura affinis	antonii?, E Rift Valley		All		V		L		
Sarothrura affinis	antonii?, W Rift Valley		All		V		L		
Sarothrura affinis	affinis		All		V		L		
Sarothrura insularis	Madagascar		All		V		L		
Sarothrura ayresi	Ethiopia	1	All	CR	S		s		
Sarothrura ayresi	Southern Africa	1	All	CR	S		s		
Sarothrura watersi	Madagascar		All	EN	V		L		
Himantornis haematopus	Africa		All		V		v		
Mentocrex kioloides	berliozi		All	NT	V		v		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Mentocrex kioloides	kioloides		All	NT	V		v		
Mentocrex beankaensis	bemaraha?		All	NT	D		L		
Rallus aquaticus	aquaticus, Europe & North Africa	1	Breeding		V		v		Gilbert et al. (2011) pp. 184-186
Rallus aquaticus	korejewi, Western Siberia/South-west Asia	1	Breeding		V		v		
Rallus caerulescens	Southern & Eastern Africa	1	All		V		v		
Rallus madagascariensis	Madagascar		All	VU	V		v		
Dryolimnas cuvieri	cuvieri, Madagascar		All		V		v		
Dryolimnas cuvieri	aldabranus, Aldabra		All		V		v		
Dryolimnas cuvieri	aldabranus, Ile aux Cerdes, Aldabra		All		V		v		
Crex egregia	Sub-Saharan Africa	1	All		V		v		
Crex crex	Europe & Western Asia/Sub-Saharan Africa	1	All		V		v		Gilbert et al. (2011) pp. 189-195
Rougetius rougetii	Ethiopian highlands		All	NT	V		L		
Atlantisia rogersi	Inaccessible Is		All	VU	S		S		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Porzana porzana	NC Asia (bre)								
Porzana porzana	Europe/Africa	1	All		V		v		Gilbert et al. (2011) pp. 187-188
Zapornia flavirostra	Sub-Saharan Africa	1	All		D			j	
Zapornia parva	Western Eurasia/Africa	1	All		V		v		
Zapornia pusilla	intermedia, Europe (bre)	1	Breeding		V		v		
Zapornia pusilla	intermedia, Eastern and Southern Africa, Madagascar		Breeding		V		v		
Zapornia pusilla	pusilla		All		V		v		
Zapornia olivieri	Madagascar		All	EN	V		v		
Amaurornis marginalis	Sub-Saharan Africa	1	All		V		v		
Porphyrio porphyrio	porphyrio		All		V			i	
Porphyrio porphyrio	madagascariensis, Egypt		All		V			i	
Porphyrio porphyrio	madagascariensis, W Africa		All		V			i	
Porphyrio porphyrio	madagascariensis, E, C, S Africa		All		V			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Porphyrio porphyrio	madagascariensis, Madagascar		All		V			i	
Porphyrio porphyrio	caspius		All		V			i	
Porphyrio porphyrio	seistanicus		All		V			i	
Porphyrio alleni	Sub-Saharan Africa	1	All		D			i	
Gallinula chloropus	chloropus, Europe & North Africa	1	Al		D		d		
Gallinula chloropus	chloropus, West & South-west Asia	1	All		D			i	
Gallinula chloropus	meridionalis		All		D			i	
Gallinula chloropus	pyrrhorrhoa		All		D			i	
Gallinula chloropus	orientalis								
Gallinula angulata	Sub-Saharan Africa	1	All		D			i	
Fulica cristata	Spain & Morocco	1	All			I		i	
Fulica cristata	Sub-Saharan Africa	1	All		D			i & j	
Fulica cristata	Madagascar		All		D			j	
Fulica atra	atra, North-west Europe (win)	1	All		D			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Fulica atra	atra, Black Sea & Mediterranean (win)	1	All		D			i	
Fulica atra	atra, South-west Asia (win)	1	All		D			i	
Balearica regulorum	regulorum, Southern Africa (N to Angola & S Zimbabwe)	1	All	EN	D			i	
Balearica regulorum	gibbericeps, Eastern Africa (Kenya to Mozambique)	1	All	EN	D			i	
Balearica pavonina	pavonina, West Africa (Senegal to Chad)	1	All	VU	D			i	
Balearica pavonina	ceciliae, Eastern Africa (Sudan to Uganda)	1	All	VU	D			i	
Leucogeranus leucogeranus	Iran (win)	1	All	CR		I		i	
Bugeranus carunculatus	Ethiopia		All	VU	D			i	
Bugeranus carunculatus	South Africa		All	VU	D			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Bugeranus carunculatus	Central & Southern Africa	1	All	VU	D			i	
Anthropoides paradiseus	Extreme Southern Africa	1	All	VU	D		s		
Anthropoides paradiseus	N Namibia		All	VU	D		s		
Anthropoides virgo	NW Africa (bre)		All		D			r	
Anthropoides virgo	Black Sea (Ukraine)/North-east Africa	1	Breeding		D			r	
Anthropoides virgo	Kalmykia/North-east Africa	1	Breeding		D			r	
Anthropoides virgo	W Central Asia (bre)		All						
Grus grus	grus, North-west Europe/Iberia & Morocco	1	Wintering			R		r	
Grus grus	grus, North-east & Central Europe/North Africa	1	Wintering			R		r	
Grus grus	grus, Eastern Europe/Turkey, Middle East & NE Africa	1	Wintering			R		r	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Grus grus	grus, Western Siberia/South Asia	1	Wintering			R		r	
Grus grus	archibaldi, Turkey & Georgia (bre)	1	Breeding		D		s		
Gavia stellata	North-west Europe (win)	1	Wintering			I & O		i	Gilbert et al. (2011) pp. 31-37
Gavia stellata	Caspian, Black Sea & East Mediterranean (win)	1	Wintering			I & O		i	
Gavia arctica	arctica, Northern Europe & Western Siberia/Europe	1	All		D			i	Gilbert et al. (2011) pp. 38-41
Gavia arctica	arctica, Central Siberia/Caspian	1	All		D			i	
Gavia immer	Europe (win)	1	Wintering			I & O		i	Gilbert et al. (2011) pp. 42
Gavia adamsii	Northern Europe (win)	1	Breeding	NT	D			i	
Spheniscus demersus	Southern Africa	1	All	EN	C		c		
Leptoptilos crumenifer	Sub-Saharan Africa	1	All		C			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Mycteria ibis	Sub-Saharan Africa (excluding Madagascar)	1	All		C			i	
Mycteria ibis	Madagascar		All		C			i	
Anastomus lamelligerus	lamelligerus, Sub-Saharan Africa	1	All		C			i	
Anastomus lamelligerus	madagascariensis		All		C			i	
Ciconia nigra	Southern Africa	1	All		D		d		
Ciconia nigra	South-west Europe/West Africa	1	All		D		d		
Ciconia nigra	Central & Eastern Europe/Sub-Saharan Africa	1	All		D		d		
Ciconia nigra	South Asia (non-bre)		All		D		d		
Ciconia abdimii	Sub-Saharan Africa & SW Arabia	1	All		D			p	
Ciconia microscelis	Sub-Saharan Africa	1	All		D			i	
Ciconia ciconia	ciconia, Southern Africa	1	All		D		d		
Ciconia ciconia	ciconia, W Europe & North-west	1	Breeding		D		d		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
	Africa/Sub-Saharan Africa								
Ciconia ciconia	ciconia, Central & Eastern Europe/Sub-Saharan Africa	1	All		D		d		
Ciconia ciconia	ciconia, Western Asia/South-west Asia	1	All		D		d		
Ciconia ciconia	asiatica, Turkmenistan/India		All		D		d		
Ephippiorhynchus senegalensis	Africa		All		D			i	
Platalea alba	Sub-Saharan Africa	1	All		C			i	
Platalea alba	Madagascar		All		C			i	
Platalea leucorodia	leucorodia, West Europe/West Mediterranean & West Africa	1	Breeding		C		c		
Platalea leucorodia	leucorodia, C & SE Europe/Mediterranean & Tropical Africa	1	Breeding		C		c		
Platalea leucorodia	leucorodia, Western	1	All		C		c		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
	Asia/South-west & South Asia								
Platalea leucorodia	balsaci, Coastal West Africa (Mauritania)	1	Breeding		C		c		
Platalea leucorodia	archeri, Red Sea & Somalia	1	Breeding		C		c		
Threskiornis aethiopicus	Sub-Saharan Africa	1	All		C			i	
Threskiornis aethiopicus	Iraq & Iran	1	All		C			i	
Threskiornis bernieri	bernieri		All	EN	C			i	
Threskiornis bernieri	abbotti		All	EN	C			i	
Geronticus eremita	Morocco	1	All	CR	C		C		
Geronticus eremita	South-west Asia	1	All	CR	C		C		
Geronticus calvus	Southern Africa		All	VU	C		c		
Bostrychia olivacea	olivacea		All		D		L		
Bostrychia olivacea	rothschildi		All		D		L		
Bostrychia olivacea	cupreipennis		All		D		L		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Bostrychia olivacea	akeleyorum		All		D		L		
Bostrychia bocagei	SÃ£o TomÃ©		All	CR	S		s		
Bostrychia rara	C Africa		All		D		L		
Bostrychia rara	W Africa		All		D		L		
Bostrychia hagedash	brevirostris		All		D		L		
Bostrychia hagedash	brevirostris (erlangeri), C & E Africa		All		D		L		
Bostrychia hagedash	nilotica		All		D		L		
Bostrychia hagedash	hagedash		All		D		L		
Bostrychia carunculata	Ethiopia		All		C		L		
Plegadis falcinellus	Sub-Saharan Africa (bre)	1	Breeding		C			j	
Plegadis falcinellus	Madagascar		All		C			i	
Plegadis falcinellus	Black Sea & Mediterranean/West Africa	1	Breeding		C		c		
Plegadis falcinellus	South-west Asia/Eastern Africa	1	None		C		c		Breeding range overlaps with the population

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
									wintering in S Asia, wintering range the population breeding in Sub-Saharan Africa.
Lophotibis cristata	Madagascar		All	NT	D		L		
Tigriornis leucolopha	W & C Africa		All		D		s		
Botaurus stellaris	capensis, Southern Africa	1	All		V		L		
Botaurus stellaris	stellaris, W Europe, NW Africa (bre)	1	All		V		L		Gilbert et al. (2011) pp. 84-86
Botaurus stellaris	stellaris, C & E Europe, Black Sea & E Mediterranean (bre)	1	All		V		L		
Botaurus stellaris	stellaris, South-west Asia (win)	1	Wintering			?		i	Breeding range overlaps with the population wintering in S Asia, but population estimate outside of the breeding season will be not possible for this secretive species.
Ixobrychus minutus	minutus, W Europe, NW	1	Breeding		V		L		Garcia (2009) https://www.raco.cat/inde

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
	Africa/Subsaharan Africa								x.php/RCOrnitologia/article/viewFile/240778/323289
Ixobrychus minutus	minutus, C & E Europe, Black Sea & E Mediterranean/Sub-saharan Africa	1	Breeding		V		L		
Ixobrychus minutus	minutus, West & South-west Asia/Sub-Saharan Africa	1	Breeding		V		L		
Ixobrychus minutus	payesii, Sub-Saharan Africa	1	Breeding		V		L		
Ixobrychus minutus	podiceps		All		V		L		
Ixobrychus sinensis	Seychelles		All		V		L		
Ixobrychus sturmii	Sub-Saharan Africa	1	All		V		L		
Calherodius leuconotus	Africa		All		D			i	
Nycticorax nycticorax	nycticorax, W Europe, NW Africa (bre)	1	Breeding		C		c		
Nycticorax nycticorax	nycticorax, C & E Europe/Black Sea	1	Breeding		C		c		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
	& E Mediterranean (bre)								
Nycticorax nycticorax	nycticorax, Western Asia/SW Asia & NE Africa	1	Breeding		C		c		
Nycticorax nycticorax	nycticorax, Sub-Saharan Africa & Madagascar	1	Breeding		C			j	
Butorides striata	atricapilla		All		D			i	
Butorides striata	brevipes		All		D			i	
Butorides striata	rutenbergi		All		D			i	
Butorides striata	crawfordi		All						
Butorides striata	rhizophorae		All		D			i	
Butorides striata	degens		All		D			i	
Butorides striata	javanica		All		D			i	
Ardeola ralloides	ralloides, SW Europe, NW Africa (bre)	1	Breeding		C		c		
Ardeola ralloides	ralloides, C & E Europe, Black Sea & E Mediterranean (bre)	1	Breeding		C		c		
Ardeola ralloides	ralloides, West & South-west	1	Breeding		C		c		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
	Asia/Sub-Saharan Africa								
Ardeola ralloides	paludivaga, Sub-Saharan Africa & Madagascar	1	Breeding		C		c		
Ardeola idae	Madagascar & Aldabra/Central & Eastern Africa	1	All	EN	C			j	
Ardeola rufiventris	Central, Eastern & Southern Africa	1	All		C			j	
Bubulcus ibis	ibis, Southern Africa	1	All		C			i	
Bubulcus ibis	ibis, Tropical Africa	1	Breeding		C		c		
Bubulcus ibis	ibis, North-west Africa	1	All		C			i	
Bubulcus ibis	ibis, South-west Europe	1	All		C			i	
Bubulcus ibis	ibis, East Mediterranean & South-west Asia	1	Breeding		C		c		
Bubulcus ibis	seychellarum		All		C			i	
Ardea cinerea	cinerea, Sub-Saharan Africa	1	Breeding		C			j	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Ardea cinerea	cinerea, Northern & Western Europe	1	Breeding		C			i	
Ardea cinerea	cinerea, Central & Eastern Europe	1	Breeding		C			i	
Ardea cinerea	cinerea, West & South-west Asia (bre)	1	Breeding		C			i	
Ardea cinerea	firasa		All		C			i	
Ardea cinerea	monicae		Breeding		C			j	
Ardea melanocephala	Sub-Saharan Africa	1	All		C			i	
Ardea humbloti	Madagascar		All	EN	C			i	
Ardea goliath	Sub-Saharan Africa		All		D			i	
Ardea goliath	SW Asia		All		D			i	
Ardea purpurea	purpurea, Tropical Africa	1	Breeding		C			j	
Ardea purpurea	purpurea, West Europe & West Mediterranean/West Africa	1	Breeding		C		c		
Ardea purpurea	purpurea, East Europe, Black Sea & Meditereean/Sub-Saharan Africa	1	Breeding		C		c		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Ardea purpurea	purpurea, SW Asia (bre)	1	Breeding		C		c		
Ardea purpurea	madagascariensis		All		C			i	
Ardea purpurea	bournei		All		C		c		
Ardea alba	alba, W, C & SE Europe/Black Sea & Mediterranean	1	All		C			i & g	
Ardea alba	alba, Western Asia/South-west Asia	1	All		C			i	
Ardea alba	melanorhynchos, Sub-Saharan Africa & Madagascar	1	All		C			i	
Ardea brachyrhyncha	Sub-Saharan Africa	1			C			i	
Egretta ardesiaca	Sub-Saharan Africa	1	All		C			i	
Egretta vinaceigula	Central Southern Africa	1	All	VU	C			i	
Egretta garzetta	garzetta, Sub-Saharan Africa	1	Breeding		C			j	
Egretta garzetta	garzetta, Western Europe, NW Africa	1	Breeding		C		c		
Egretta garzetta	garzetta, Central & E Europe, Black	1	Breeding		C		c		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
	Sea, E Mediterranean								
Egretta garzetta	garzetta, Western Asia/SW Asia, NE & Eastern Africa	1	Breeding		C		L		
Egretta gularis	gularis, West Africa	1	All		C			i	
Egretta gularis	schistacea, South-west Asia & South Asia	1	All		C			i	
Egretta gularis	schistacea, North-east Africa & Red Sea	1	Breeding		C			i	
Egretta gularis	dimorpha, Madagascar		All		C			i	
Egretta gularis	dimorpha, Coastal Eastern Africa	1	Breeding		C			i	
Egretta gularis	dimorpha, Aldabra & Amirante Is		All		C			i	
Scopus umbretta	minor		All		D			i	
Scopus umbretta	umbretta		All		D			i	
Scopus umbretta	umbretta (tenuirostris), Madagascar		All		D			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Balaeniceps rex	Central Tropical Africa	1	All	VU	S		s		Roxburgh & Buchanan (2010) / URL: https://www.researchgate.net/profile/Lizanne_Roxburgh/publication/233320592_Revising_estimates_of_the_Shoebill_Balaeniceps_rex_population_size_in_the_Bangweulu_Swamp_Zambia_through_a_combination_of_aerial_surveys_and_habitat_suitability_modelling/links/573c21eb08ae9f741b2e0c1c/Revising-estimates-of-the-Shoebill-Balaeniceps-rex-population-size-in-the-Bangweulu-Swamp-Zambia-through-a-combination-of-aerial-surveys-and-habitat-suitability-modelling.pdf
Pelecanus crispus	Black Sea & Mediterranean (win)	1	All	NT	C			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Pelecanus crispus	South-west Asia & South Asia (win)	1	All	NT	C			i	
Pelecanus rufescens	Tropical Africa & SW Arabia	1	All		C			i	
Pelecanus onocrotalus	West Africa	1	All		C			i	
Pelecanus onocrotalus	Eastern Africa	1	All		C			i	
Pelecanus onocrotalus	Southern Africa	1	All		C			i	
Pelecanus onocrotalus	Europe & Western Asia (bre)	1	All		C			i	
Fregata ariel	iredalei, W Indian Ocean	1			C		c		
Fregata minor	aldabrensis, W Indian Ocean	1			C		c		
Morus bassanus	North Atlantic	1	All		C		c		Gilbert et al. (2011) pp. 64-70
Morus capensis	Southern Africa	1	All	EN	C		c		
Sula dactylatra	melanops, W Indian Ocean	1			C		c		
Microcarbo coronatus	Coastal South-west Africa	1	All	NT	C			i	
Microcarbo africanus	africanus, W Africa		All		C			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Microcarbo africanus	africanus, S, E Africa		All		C			i	
Microcarbo africanus	pictilis		All		C			i	
Microcarbo pygmaeus	Black Sea & Mediterranean	1	All		C			i	
Microcarbo pygmaeus	South-west Asia	1	All		C			i	
Phalacrocorax aristotelis	aristotelis		All		C		c		Gilbert et al. (2011) pp. 72-83
Phalacrocorax aristotelis	desmarestii		All		C		c		
Phalacrocorax aristotelis	riggenbachi		All		C		c		
Phalacrocorax carbo	carbo, Greenland		All						
Phalacrocorax carbo	carbo, North-west Europe	1	Breeding		C		c		Gilbert et al. (2011) pp. 71-77
Phalacrocorax carbo	sinensis, Northern & Central Europe	1	All		C			i	Gilbert et al. (2011) pp. 71-77
Phalacrocorax carbo	sinensis, Black Sea & Mediterranean	1	All		C			i	
Phalacrocorax carbo	sinensis, West & South-west Asia	1	All		C			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Phalacrocorax carbo	maroccanus		All		C			i	
Phalacrocorax carbo	lucidus, Coastal West Africa	1	All		C			i	
Phalacrocorax carbo	lucidus, Central & Eastern Africa	1	All		C			i	
Phalacrocorax carbo	lucidus, Coastal Southern Africa	1	All		C			i	
Phalacrocorax capensis	Coastal Southern Africa	1	All	EN	C		c		
Phalacrocorax nigrogularis	Arabian Coast	1	All	VU	C		c		
Phalacrocorax nigrogularis	Gulf of Aden, Socotra, Arabian Sea	1	All	VU	C		c		
Phalacrocorax neglectus	Coastal South-west Africa	1	All	EN	C		c		
Anhinga rufa	rufa, W Africa		All		C			i	
Anhinga rufa	rufa, S & E Africa		All		C			i	
Anhinga rufa	vulsini		All		C			i	
Anhinga rufa	chantrei		All		C			i	
Burhinus oedicnemus	oedicnemus, W Europe (bre)		All		D		d		
Burhinus oedicnemus	oedicnemus, E Europe (bre)		All		V		v		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Burhinus oedicnemus	saharae		All		V		v		
Burhinus oedicnemus	harterti		All		V		v		
Burhinus oedicnemus	distinctus		All		V		v		
Burhinus oedicnemus	insularum		All		V		v		
Burhinus senegalensis	West Africa	1	All		V		v		
Burhinus senegalensis	North-east & Eastern Africa	1	All		V		v		
Burhinus vermiculatus	buttikoferi		All		V		v		
Burhinus vermiculatus	vermiculatus		All		V		v		
Burhinus capensis	maculosus		All		V		v		
Burhinus capensis	dodsoni		All		V		v		
Burhinus capensis	capensis		All		V		v		
Burhinus capensis	damarensis		All		V		v		
Pluvianus aegyptius	West Africa	1	All		D			i	
Pluvianus aegyptius	Eastern Africa	1	All		D			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Pluvianus aegyptius	Lower Congo Basin	1	All		D			i	
Haematopus moquini	Coastal Southern Africa	1	All		D			i	
Haematopus ostralegus	longipes, SE Eur & W Asia/SW Asia & NE Africa	1	All	NT	D			i	Gilbert et al. (2011) pp. 196
Haematopus ostralegus	ostralegus, Europe/South & West Europe & NW Africa	1	All	NT	D			i	
Recurvirostra avosetta	Southern Africa	1	All		C			i	
Recurvirostra avosetta	Eastern Africa	1	All		C			i	
Recurvirostra avosetta	Western Europe & North-west Africa (bre)	1	All		C			i	Gilbert et al. (2011) pp. 197-201
Recurvirostra avosetta	South-east Europe, Black Sea & Turkey (bre)	1	All		C			i	
Recurvirostra avosetta	West & South-west Asia/Eastern Africa	1	All		C			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Himantopus himantopus	himantopus, Sub-Saharan Africa (excluding south)	1			D			j	
Himantopus himantopus	himantopus, Madagascar				D			j	
Himantopus himantopus	himantopus, Southern Africa	1			D			j	
Himantopus himantopus	himantopus, SW Europe & North-west Africa/West Africa	1	Breeding		D		d		
Himantopus himantopus	himantopus, Central Europe & E Mediterranean/N-Central Africa	1	Breeding		D		d		
Himantopus himantopus	himantopus, W, C & SW Asia/SW Asia & NE Africa	1	Breeding		D		d		
Pluvialis squatarola	squatarola, W Siberia/W Europe & W Africa	1	Wintering			I		i	Gilbert et al. (2011) pp. 211
Pluvialis squatarola	squatarola, C & E Siberia/SW Asia, Eastern & Southern Africa	1	Wintering			I		i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Pluvialis apricaria	apricaria, Britain, Ireland, Denmark, Germany & Baltic (bre)	1	Breeding		D		d		Gilbert et al. (2011) pp. 210
Pluvialis apricaria	altifrons, Iceland & Faroes/East Atlantic coast	1	Breeding		D		d		
Pluvialis apricaria	altifrons, Northern Europe/Western Europe & NW Africa	1	Breeding		D		d		
Pluvialis apricaria	altifrons, Northern Siberia/Caspian & Asia Minor	1	Breeding		D			w	
Pluvialis fulva	North-central Siberia/South & SW Asia, NE Africa	1	Wintering			I		i	
Eudromias morinellus	Europe/North-west Africa	1	All		D		d		Gilbert et al. (2011) pp. 206-209
Eudromias morinellus	Asia/Middle East	1	All		D		d		
Charadrius hiaticula	hiaticula, Northern Europe/Europe & North Africa	1	Breeding		D			i	Gilbert et al. (2011) pp. 203-205

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Charadrius hiaticula	psammodromus, Canada, Greenland & Iceland/W & S Africa	1	Breeding		D			i	
Charadrius hiaticula	tundrae, NE Europe & Siberia/SW Asia, E & S Africa	1	Breeding		D			i	
Charadrius dubius	curonicus, Europe & North-west Africa/West Africa	1	Breeding		D			i	
Charadrius dubius	curonicus, West & South-west Asia/Eastern Africa	1	Breeding		D			i	
Charadrius thoracicus	Madagascar		All	VU	D			i	
Charadrius pecuarius	Southern & Eastern Africa	1	All		D			j	
Charadrius pecuarius	West Africa	1	All		D			i	
Charadrius pecuarius	Madagascar		All		D			i	
Charadrius pecuarius	(allenbyi)		All		D			i	
Charadrius sanctaehelenae	Saint Helena		All	VU	D		d		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Charadrius tricollaris	Southern & Eastern Africa	1	All		D			i	
Charadrius tricollaris	Lake Chad		All		D			i	
Charadrius bifrontatus	Madagascar		All		D			i	
Charadrius forbesi	Western & Central Africa	1	All		D		L		
Charadrius marginatus	hesperius, West Africa	1	Breeding		D		L		
Charadrius marginatus	mechowi, Inland East & Central Africa	1	Breeding		D		L		
Charadrius marginatus	mechowi? W Coast Africa		Breeding		D		L		
Charadrius marginatus	marginatus		Breeding		D		L		
Charadrius marginatus	marginatus, SW African coast		Breeding		D		L		
Charadrius marginatus	arenaceus, SE African coast		Breeding		D		L		
Charadrius marginatus	tenellus Madagascar		Breeding		D		L		
Charadrius marginatus	tenellus? Coastal E Africa		Breeding		D		L		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Charadrius alexandrinus	alexandrinus, West Europe & West Mediterranean/West Africa	1	Breeding		D			i	
Charadrius alexandrinus	alexandrinus, Black Sea & East Mediterranean/Eastern Sahel	1	Breeding		D			i	
Charadrius alexandrinus	alexandrinus, SW & Central Asia/SW Asia & NE Africa	1	Breeding		D			i	
Charadrius pallidus	venustus, Eastern Africa	1	All	NT	D			i	
Charadrius pallidus	pallidus, Southern Africa	1	All	NT	D			j	
Charadrius mongolus	pamirensis, West-central Asia/SW Asia & Eastern Africa	1	All		D			i	
Charadrius leschenaultii	columbinus, Turkey & SW Asia/E. Mediterranean & Red Sea	1	Breeding		D		L		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Charadrius leschenaultii	scythicus, Caspian & SW Asia/Arabia & NE Africa	1	Breeding		D			i	
Charadrius leschenaultii	leschenaultii, Central Asia/Eastern & Southern Africa	1	Breeding		D			i	
Charadrius asiaticus	SE Europe & West Asia/E & Central Southern Africa	1	All		D			i & w	
Vanellus vanellus	Europe, W Asia/Europe, N Africa & SW Asia	1	All	NT	D		d		Gilbert et al. (2011) pp. 212-2014
Vanellus crassirostris	crassirostris, E & C Africa		All		D			i	
Vanellus crassirostris	crassirostris, Lake Chad Basin		All		D			i	
Vanellus crassirostris	leucopterus, W Angola		All		D			i	
Vanellus crassirostris	leucopterus, Zambia, Mozambique		All		D			i	
Vanellus armatus	S & E Africa		All		D			i	
Vanellus spinosus	Africa		All		D		d		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Vanellus spinosus	Black Sea & Mediterranean (bre)	1	All		D		d		
Vanellus tectus	tectus		All		D		d		
Vanellus tectus	latifrons		All		D		d		
Vanellus albiceps	West & Central Africa	1	All		D			i	
Vanellus albiceps	Tanzania		All		D			i	
Vanellus albiceps	SE Africa		All		D			i	
Vanellus lugubris	Central & Eastern Africa	1	All		D		d		
Vanellus lugubris	Southern West Africa	1	All		D		d		
Vanellus melanopterus	melanopterus, Ethiopia		All		D		d		
Vanellus melanopterus	minor, Southern Africa	1	All		D		d		
Vanellus melanopterus	minor, Kenya, Tanzania		All		D		d		
Vanellus coronatus	coronatus, Eastern & Southern Africa	1	All		D		d		
Vanellus coronatus	coronatus, Central Africa	1	All		D		d		
Vanellus coronatus	coronatus, South-west Africa	1	All		D		d		
Vanellus coronatus	demissus		All		D		d		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Vanellus senegallus	senegallus, West Africa	1	All		D			i	
Vanellus senegallus	lateralis (solitaneus), South-west Africa		All		D			i	
Vanellus senegallus	lateralis, Eastern & South-east Africa	1	All		D			i	
Vanellus senegallus	major		All		D			i	
Vanellus melanocephalus	Ethiopia		All		D		d		
Vanellus superciliosus	West & Central Africa	1	All		D		d		
Vanellus indicus	aigneri		All		D		d		
Vanellus gregarius	Central Asia/S, SW Asia, NE Africa	1	All	CR	D		d		
Vanellus leucurus	C & SW Asia/NE Africa, SW & S Asia	1	All		D		d		
Rostratula benghalensis	Sub-Saharan Africa		All		D		L		
Rostratula benghalensis	Lower Nile		All		D		L		
Rostratula benghalensis	Madagascar		All		D		L		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Rostratula benghalensis	South-Western Cape		All		D		L		
Actophilornis africanus	Sub-Saharan Africa		All		D			i	
Actophilornis albinucha	Madagascar		All	NT	D			i	
Microparra capensis	Sub-Saharan Africa		All		D		L		
Numenius phaeopus	islandicus, Iceland, Faroes & Scotland/West Africa	1	Breeding		D		d		Gilbert et al. (2011) pp. 232-233
Numenius phaeopus	phaeopus, Northern Europe/West Africa	1	Breeding		D		d		
Numenius phaeopus	phaeopus, West Siberia/Southern & Eastern Africa	1	Breeding		D		d		
Numenius phaeopus	alboaxilliaris, South-west Asia/Eastern Africa	1	Breeding		D		d		
Numenius phaeopus	rogachevae, C Siberia (bre)	1	Breeding		D		d		
Numenius tenuirostris	Central Siberia/Mediterranean & SW Asia	1	Quasi extinct	CR	S			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Numenius arquata	arquata, Europe/Europe, North & West Africa	1	All	NT	D		d		Gilbert et al. (2011) pp. 231-234
Numenius arquata	suschkini, South-east Europe & South-west Asia (bre)	1	Breeding	NT	D		d		
Numenius arquata	orientalis, Western Siberia/SW Asia, E & S Africa	1	Breeding	NT	D			i	
Limosa lapponica	lapponica, Northern Europe/Western Europe	1	All	NT		I		i	Gilbert et al. (2011) pp. 231
Limosa lapponica	taymyrensis, Western Siberia/West & South-west Africa	1	Wintering	NT		I		i	Gilbert et al. (2011) pp. 231
Limosa lapponica	taymyrensis, Central Siberia/South & SW Asia & Eastern Africa	1	Wintering	NT		I		i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Limosa limosa	islandica, Iceland/Western Europe	1	Breeding	NT	D		d		
Limosa limosa	limosa, Western Europe/NW & West Africa	1	Breeding	NT	D		d		Gilbert et al. (2011) pp. 229-230
Limosa limosa	limosa, Eastern Europe/Central & Eastern Africa	1	Breeding	NT	D		d		
Limosa limosa	limosa, West-central Asia/SW Asia & Eastern Africa	1	All	NT	D		d		
Arenaria interpres	interpres, NE Canada & Greenland/W Europe & NW Africa	1	Breeding			I		i	Gilbert et al. (2011) pp. 239
Arenaria interpres	interpres, Northern Europe/West Africa	1	Breeding			I		i	Gilbert et al. (2011) pp. 239
Arenaria interpres	interpres, West & Central Siberia/SW Asia, E & S Africa	1	Breeding			I		i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Calidris tenuirostris	Eastern Siberia/SW Asia & W Southern Asia	1	Wintering	EN		I?		i	
Calidris canutus	islandica, NE Canada & Greenland/Western Europe	1	All	NT		I		i	Gilbert et al. (2011) pp. 215
Calidris canutus	canutus, Northern Siberia/West & Southern Africa	1	All	NT		I		i	
Calidris pugnax	Northern Europe & Western Siberia/West Africa	1	None		D			i	Gilbert et al. (2011) pp. 220
Calidris pugnax	Northern Siberia/SW Asia, E & S Africa	1	None		D			i	
Calidris falcinellus	falcinellus, Northern Europe/SW Asia & Africa	1	All		D			i	
Calidris ferruginea	Western Siberia/West Africa	1	Wintering	NT		I		i	
Calidris ferruginea	Central Siberia/SW Asia, E & S Africa	1	Wintering	NT		I		i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Calidris temminckii	Fennoscandia/North & West Africa	1	All		D		d		
Calidris temminckii	NE Europe & W Siberia/SW Asia & Eastern Africa	1	All		D			i	
Calidris alba	alba, East Atlantic Europe, West & Southern Africa (win)	1	Wintering			I		i	
Calidris alba	alba, South-west Asia, Eastern & Southern Africa (win)	1	Wintering			I		i	
Calidris alpina	arctica, NE Greenland/West Africa	1	Breeding		D		d		
Calidris alpina	schinzii, Iceland & Greenland/NW and West Africa	1	Breeding		D			i	
Calidris alpina	schinzii, Britain & Ireland/SW Europe & NW Africa	1	Breeding		D		d		Gilbert et al. (2011) pp. 219
Calidris alpina	schinzii, Baltic/SW Europe & NW Africa	1	Breeding		D		d		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Calidris alpina	alpina, NE Europe & NW Siberia/W Europe & NW Africa	1	Breeding		D			i	
Calidris alpina	centralis, Central Siberia/SW Asia & NE Africa	1	Breeding		D			i	
Calidris maritima	N Europe & W Siberia (breeding)	1	Breeding		D		d		Gilbert et al. (2011) pp. 217
Calidris maritima	West Greenland		All		D		d		
Calidris maritima	NE Canada & N Greenland (breeding)	1	Breeding		D		d		
Calidris maritima	Iceland (littoralis)		All		D		d		
Calidris minuta	N Europe/S Europe, North & West Africa	1	None		D			i	
Calidris minuta	Western Siberia/SW Asia, E & S Africa	1	None		D			i	
Scolopax rusticola	Europe/South & West Europe & North Africa	1	All		S		s		Gilbert et al. (2011) pp. 225-228
Scolopax rusticola	Azores		All		S		s		
Scolopax rusticola	Madeira		All		S		s		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Scolopax rusticola	Canary Islands		All		S		s		
Scolopax rusticola	Western Siberia/South-west Asia (Caspian)	1	All		S		s		
Gallinago stenura	Northern Siberia/South Asia & Eastern Africa	1	Breeding?		D		d		
Gallinago nigripennis	aequatoralis		All		D		L		
Gallinago nigripennis	angolensis		All		D		L		
Gallinago nigripennis	nigripennis		All		D		L		
Gallinago macrodactyla	Madagascar		All	VU	D		L		
Gallinago media	Scandinavia/probably West Africa	1	Breeding	NT	D		d		
Gallinago media	Western Siberia & NE Europe/South-east Africa	1	Breeding	NT	D		d		
Gallinago gallinago	faeroeensis, Iceland, Faroes & Northern Scotland/Ireland	1	Breeding		D		d		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Gallinago gallinago	gallinago, Europe/South & West Europe & NW Africa	1	Breeding		D			i	Gilbert et al. (2011) pp. 224
Gallinago gallinago	gallinago, Western Siberia/South-west Asia & Africa	1	Breeding		D			i	
Lymnocryptes minimus	Northern Europe/S & W Europe & West Africa	1	All		D			s	Gilbert et al. (2011) pp. 221-223
Lymnocryptes minimus	Western Siberia/SW Asia & NE Africa	1	All		D			s	
Phalaropus lobatus	Western Eurasia/Arabian Sea	1	All		D		d		Gilbert et al. (2011) pp. 240-243
Phalaropus fulicarius	Canada & Greenland/Atlantic coast of Africa	1	All		D		d		
Xenus cinereus	NE Europe & W Siberia/SW Asia, E & S Africa	1	All		D			i	
Actitis hypoleucos	West & Central Europe/West Africa	1	All		D		d		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Actitis hypoleucos	E Europe & W Siberia/Central, E & S Africa	1	All		D			i	
Tringa ochropus	Northern Europe/S & W Europe, West Africa	1	All?		D			i	
Tringa ochropus	Western Siberia/SW Asia, NE & Eastern Africa	1	All?		D			i	
Tringa erythropus	N Europe/Southern Europe, North & West Africa	1	All?		D			i	
Tringa erythropus	Western Siberia/SW Asia, NE & Eastern Africa	1	All?		D			i	
Tringa nebularia	Northern Europe/SW Europe, NW & West Africa	1	All?		D		d		Gilbert et al. (2011) pp. 236-238
Tringa nebularia	Western Siberia/SW Asia, E & S Africa	1	All?		D			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Tringa totanus	robusta, Iceland & Faroes/Western Europe	1	Breeding		D		d		
Tringa totanus	totanus, Britain & Ireland/Britain, Ireland, France	1	Breeding		D		d		Gilbert et al. (2011) pp. 235
Tringa totanus	totanus, Northern Europe (breeding)	1	Breeding		D		d		
Tringa totanus	totanus, Central & East Europe (breeding)	1	Breeding		D		d		
Tringa totanus	ussuriensis, Western Asia/SW Asia, NE & Eastern Africa	1	Breeding		D		d		
Tringa glareola	NE Europe & W Siberia/Eastern & Southern Africa	1	All?		D		d		
Tringa glareola	North-west Europe/West Africa	1	All?		D			i	
Tringa stagnatilis	Eastern Europe/West & Central Africa	1	All?		D			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Tringa stagnatilis	Western Asia/SW Asia, Eastern & Southern Africa	1	All?		D			i	
Dromas ardeola	North-west Indian Ocean, Red Sea & Gulf	1	All		C			i	
Smutsornis africanus	raffertyi				D		L		
Smutsornis africanus	hartingi				D		L		
Smutsornis africanus	gracilis				D		L		
Smutsornis africanus	bisignatus				D		L		
Smutsornis africanus	erlangeri				D		L		
Smutsornis africanus	traylori				D		L		
Smutsornis africanus	africanus (including range of unrecognised race sharpei)				D		L		
Smutsornis africanus	granti				D		L		
Rhinoptilus cinctus	mayaudi				D		L		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Rhinoptilus cinctus	balsaci				D		L		
Rhinoptilus cinctus	cinctus				D		L		
Rhinoptilus cinctus	emini				D		L		
Rhinoptilus cinctus	seebohmi				D		L		
Rhinoptilus chalcopterus	Sahel				D		L		
Rhinoptilus chalcopterus	E & S Africa				D		L		
Cursorius cursor	bogulubovi		All		D		L		
Cursorius cursor	cursor (bannermani)		All		D		L		
Cursorius cursor	cursor		All		D		L		
Cursorius cursor	exsul		All		D		L		
Cursorius somalensis	littoralis		All		D		L		
Cursorius somalensis	somalensis		All		D		L		
Cursorius rufus	Namibia &Â South Africa W from 21 degree E (theresae)		All		D		L		
Cursorius rufus	rufus		All		D		L		
Cursorius temminckii	temminckii, W Africa		All		D		L		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Cursorius temminckii	temminckii, E Africa		All		D		L		
Cursorius temminckii	ruvanensis		All		D		L		
Cursorius temminckii	aridus		All		D		L		
Glareola pratincola	pratincola, Western Europe & NW Africa/West Africa	1	Breeding		C		c		
Glareola pratincola	pratincola, Black Sea & E Mediterranean/Eastern Sahel zone	1	Breeding		C		c		
Glareola pratincola	pratincola, SW Asia/SW Asia & NE Africa	1	Breeding		C		c		
Glareola pratincola	pratincola (limbata), Red Sea		Breeding		C		c		
Glareola pratincola	fulleborni (boweni), West Africa to Central African Republic		Breeding		C		c		
Glareola pratincola	fuelleborni, Eastern and Southern Africa		All		C		c		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Glareola pratincola	erlangeri, coastal southern Somalia and N Kenya		Breeding		C		c		
Glareola nordmanni	SE Europe & Western Asia/Southern Africa	1	All	NT	C		c		
Glareola ocularis	Madagascar/East Africa	1	All	VU	C		c		
Glareola nuchalis	liberiae, West Africa	1	All		C		c		
Glareola nuchalis	nuchalis, Eastern & Central Africa	1	All		C		c		
Glareola cinerea	(colorata)		All		C		c		
Glareola cinerea	SE West Africa & Central Africa	1	All		C		c		
Anous stolidus	plumbeigularis, Red Sea & Gulf of Aden	1			C		c		
Anous stolidus	pileatus				C		c		
Anous stolidus	stolidus				C		c		
Anous tenuirostris	tenuirostris, Indian Ocean Islands to E Africa	1			C		c		
Anous minutus	atlanticus				C		c		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Gygis alba	candida, Indian Ocean		All		C		c		
Rynchops flavirostris	Coastal West Africa & Central Africa	1	All	NT	C		c		
Rynchops flavirostris	Eastern & Southern Africa	1	All	NT	C		c		
Hydrocoloeus minutus	Central & E Europe/SW Europe & W Mediterranean	1	All		C			i	
Hydrocoloeus minutus	W Asia/E Mediterranean, Black Sea & Caspian	1	All		C			i	
Rhodostethia rosea	High Arctic		All		D		d		
Xema sabini	sabini, Canada & Greenland/SE Atlantic	1	Breeding		C		c		
Xema sabini	palaearctica		Breeding		C		c		
Pagophila eburnea	High Arctic			NT	C		c		
Rissa tridactyla	tridactyla, Arctic from NE Canada to Novaya Zemlya/N Atlantic	1	All	VU	C		c		Gilbert et al. (2011) pp. 255-261

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Larus genei	West Africa (bre)	1	All		C			i	
Larus genei	Black Sea & Mediterranean (bre)	1	All		C			i	
Larus genei	West, South-west & South Asia (bre)	1	All		C			i	
Larus ridibundus	W Europe/W Europe, W Mediterranean, West Africa	1	All		C			i	
Larus ridibundus	East Europe/Black Sea & East Mediterranean	1	All		C			i	
Larus ridibundus	West Asia/SW Asia & NE Africa	1	All		C			i	
Larus hartlaubii	Coastal South-west Africa	1	All		C			i	
Larus cirrocephalus	poiocephalus, West Africa	1	All		C			i	
Larus cirrocephalus	Central, Eastern and Southern Africa	1	All		C			i	
Larus cirrocephalus	poiocephalus, Madagascar		All		C			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Larus ichthyaetus	Black Sea & Caspian/South-west Asia	1	All		C			i	
Larus melanocephalus	W Europe, Mediterranean & NW Africa	1	All		C			i	
Larus hemprichii	Red Sea, Gulf, Arabia & Eastern Africa	1	Al		C			i	
Larus leucophthalmus	Red Sea & nearby coasts	1	All	NT	C			i	
Larus audouinii	Mediterranean/N & W coasts of Africa	1	All		C		c		
Larus canus	canus, NW & C Europe/Atlantic coast & Mediterranean	1	Breeding		C		c		Gilbert et al. (2011) pp. 251
Larus canus	heinei, NE Europe & Western Siberia/Black Sea & Caspian	1	Breeding		C		c		
Larus dominicanus	vetula, Coastal Southern Africa	1	All		C			i	
Larus dominicanus	vetula, Coastal West Africa	1	All		C			i	

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Larus dominicanus	melisandae		All		C			i	
Larus fuscus	fuscus, NE Europe/Black Sea, SW Asia & Eastern Africa	1	Breeding		C		c		
Larus fuscus	graellsii, Western Europe/Mediterranean & West Africa	1	Breeding		C		c		Gilbert et al. (2011) pp. 252
Larus fuscus	intermedius, S Scandinavia, Netherlands, Ebro Delta, Spain	1	Breeding		C		c		
Larus fuscus	heuglini, NE Europe & W Siberia/SW Asia & NE Africa	1	Breeding		C		c		
Larus fuscus	barabensis, South-west Siberia/South-west Asia	1	Breeding		C		c		
Larus argentatus	argentatus, North & North-west Europe	1	Breeding		C		c		
Larus argentatus	argenteus, Iceland & Western Europe	1	Breeding		C		c		Gilbert et al. (2011) pp. 253
Larus armenicus	Armenia, Eastern Turkey & NW Iran	1	All	NT	C		c		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Larus michahellis	atlantis		All		C			i	
Larus michahellis	Mediterranean, Iberia & Morocco	1	All		C			i	
Larus cachinnans	Black Sea & Western Asia/SW Asia, NE Africa	1	All		C		c		
Larus glaucoides	glaucoides, Greenland/Iceland & North-west Europe	1	All		D		d		
Larus hyperboreus	hyperboreus, Svalbard & N Russia (bre)	1	Breeding		D		d		
Larus hyperboreus	leuceretes, Canada, Greenland & Iceland (bre)	1	Breeding		D		d		
Larus marinus	Greenland								
Larus marinus	North & West Europe	1	All		C			i	Gilbert et al. (2011) pp. 254
Onychoprion fuscatus	fuscatus, Gulf of Guinea & S Atlantic (bre)		All		C		c		
Onychoprion fuscatus	nubilosus, Red Sea, Gulf of Aden, E to Pacific	1	All		C		c		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Onychoprion anaethetus	melanopterus, W Africa	1	All		C		c		
Onychoprion anaethetus	antarcticus, Red Sea, E Africa, Persian Gulf, Arabian Sea to W India	1	All		C		c		
Onychoprion anaethetus	antarcticus, W Indian Ocean	1	All		C		c		
Sternula albifrons	albifrons, Europe north of Mediterranean (bre)	1	Breeding		D		d		Gilbert et al. (2011) pp. 265
Sternula albifrons	albifrons, West Mediterranean/ W Africa (bre)	1	Breeding		D		d		
Sternula albifrons	albifrons, Black Sea & East Mediterranean (bre)	1	Breeding		D		d		
Sternula albifrons	albifrons, Caspian (bre)	1	Breeding		D		d		
Sternula albifrons	guineae, West Africa (bre)	1	Breeding		D		d		
Sternula saundersi	W South Asia, Red Sea, Gulf & Eastern Africa	1	All		D		d		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Sternula balaenarum	Namibia & South Africa/Atlantic coast to Ghana	1	All	VU	C		c		
Gelochelidon nilotica	nilotica, Western Europe/West Africa	1	Breeding		C		c		
Gelochelidon nilotica	nilotica, Black Sea & East Mediterranean/Eastern Africa	1	Breeding		C		c		
Gelochelidon nilotica	nilotica, West & Central Asia/South-west Asia	1	Breeding		C		c		
Hydroprogne caspia	Southern Africa (bre)	1	All		C			i	
Hydroprogne caspia	Madagascar (bre)		All		C			i	
Hydroprogne caspia	West Africa (bre)	1	Breeding		C		c		
Hydroprogne caspia	Baltic (bre)	1	Breeding		C		c		
Hydroprogne caspia	Black Sea (bre)	1	Breeding		C		c		
Hydroprogne caspia	Caspian (bre)	1	Breeding		C		c		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Chlidonias hybrida	hybrida, Western Europe & North-west Africa (bre)	1	Breeding		D			i	
Chlidonias hybrida	hybrida, Black Sea & East Mediterranean (bre)	1	Breeding		D			i	
Chlidonias hybrida	hybrida, Caspian (bre)	1	Breeding		D			i	
Chlidonias hybrida	delalandii, Eastern Africa (Kenya & Tanzania)	1	All		D			i	
Chlidonias hybrida	delalandii, Southern Africa (Malawi & Zambia to South Africa)	1	All		D			i	
Chlidonias leucopterus	Eastern Europe & Western Asia/Africa	1	Breeding		D			i	
Chlidonias niger	niger, Europe & Western Asia/Atlantic coast of Africa	1	Breeding		D		d		
Sterna dougallii	dougallii, Southern Africa and Madagascar	1	Breeding		C		c		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Sterna dougallii	dougallii, East Africa	1	Breeding		C		c		
Sterna dougallii	dougallii, Europe (bre)	1	Breeding		C		c		Gilbert et al. (2011) pp. 263
Sterna dougallii	gracilis, North Arabian Sea (Oman)	1	Breeding		C		c		
Sterna dougallii	gracilis, Seychelles & Mascarenes	1	Breeding		C		c		
Sterna hirundo	hirundo, Southern & Western Europe (bre)	1	Breeding		C		c		
Sterna hirundo	hirundo, Northern & Eastern Europe (bre)	1	Breeding		C		c		
Sterna hirundo	hirundo, Western Asia (bre)	1	Breeding		C		c		
Sterna hirundo	hirundo, W Africa (bre)		Breeding		C		c		
Sterna repressa	W South Asia, Red Sea, Gulf & Eastern Africa	1	All		C		c		
Sterna paradisaea	Western Eurasia (bre)	1	Breeding		C		c		Gilbert et al. (2011) pp. 264

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Sterna vittata	tristanensis, Tristan da Cunha & Gough/South Africa	1	Breeding		D		d		
Sterna vittata	vittata, P.Edward, Marion, Crozet & Kerguelen/South Africa	1	Breeding		D		d		
Sterna vittata	sanctipauli		Breeding		D		d		
Thalasseus bengalensis	bengalensis, Gulf/Southern Asia	1	All?		C			i	
Thalasseus bengalensis	bengalensis, Red Sea/Eastern Africa	1	All?		C			i	
Thalasseus bengalensis	emigratus, S Mediterranean/NW & West Africa coasts	1	All		C		c		
Thalasseus sandvicensis	sandvicensis, Western Europe/West Africa	1	Breeding		C		c		Gilbert et al. (2011) pp. 262
Thalasseus sandvicensis	sandvicensis, Black Sea & Mediterranean (bre)	1	Breeding		C		c		
Thalasseus sandvicensis	sandvicensis, West & Central	1	Breeding		C		c		

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
	Asia/South-west & South Asia								
Thalasseus maximus	albidorsalis, West Africa (bre)	1	All		C		c		
Thalasseus bergii	bergii, Southern Africa (Angola - Mozambique)	1	Breeding		C			i	
Thalasseus bergii	bergii, Madagascar & Mozambique/Southern Africa	1	Breeding		C			i	
Thalasseus bergii	thalassinus, Eastern Africa & Seychelles	1	Breeding		C			i	
Thalasseus bergii	velox, Persian Gulf & Indian Ocean (bre)		Breeding		C			i	
Thalasseus bergii	velox, Red Sea & North-east Africa	1	Breeding		C			i	
Stercorarius longicaudus	longicaudus, N Europe & W Siberia/S Atlantic	1	Breeding		D			p	
Catharacta skua	N Europe/N Atlantic	1	All		D			p	Gilbert et al. (2011) pp. 244-250

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Fratercula arctica	NE Canada, N Greenland, to Jan Mayen, Svalbard, N Novaya Zemlya	1	Breeding	VU	C		c		
Fratercula arctica	Hudson bay & Maine E to S Greenland, Iceland, Bear Is, Norway to S Novaya Zemlya	1	Breeding	VU	C		c		
Fratercula arctica	Faeroes, S Norway & Sweden, Britain, Ireland, NW France	1	Breeding	VU	C		c		Gilbert et al. (2011) pp. 286-292
Cepphus grylle	grylle, Baltic Sea	1	Breeding		C		c		
Cepphus grylle	mandtii, Arctic E North America to Greenland, Jan Mayen & Svalbard E through Siberia to Alaska	1	Breeding		C		c		
Cepphus grylle	arcticus, N America, S Greenland, Britain, Ireland, Scandinavia, White Sea	1	Breeding		C		c		Gilbert et al. (2011) pp. 279-285

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Cepphus grylle	islandicus, Iceland	1	Breeding		C		c		
Cepphus grylle	faeroeensis, Faeroes	1	Breeding		C		c		
Alca torda	torda, E North America, Greenland, E to Baltic & White Seas	1	Breeding	NT	C		c		Gilbert et al. (2011) pp. 272-278
Alca torda	islandica, Iceland, Faeroes, Britain, Ireland, Helgoland, NW France	1	Breeding	NT	C		c		
Alle alle	alle, High Arctic, Baffin Is	1	Breeding		C		c		
Uria lomvia	lomvia, E North America, Greenland, E to Severnaya Zemlya	1	Breeding		C		c		
Uria aalge	aalge, Iceland, Faeroes, Scotland, S Norway, Baltic/NE Atlantic	1	Breeding		C		c		Gilbert et al. (2011) pp. 266-271
Uria aalge	albionis, Ireland, S Britain, France, Iberia, Helgoland	1	Breeding		C		c		Gilbert et al. (2011) pp. 266-271

					Population size		Population trend		
Species	Population	AEWA Table 1	Season population separated from others	Red List Status	Breeding	Non-breeding	Breeding	Non-breeding	References to existing species or population specific international monitoring schemes
Uria aalge	hyperborea, Svalbard, N Norway to Novaya Zemlya	1	Breeding		C		c		

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