Waterbird Population Size and Trend estimates for the 7th edition of the Report on the Conservation Status of Migratory Waterbirds in the AEWA Agreement Area

Methodological notes

Introductions

The Report on the Conservation Status of Migratory Waterbirds in the Agreement Area is produced according to Paragraph 7.4 of the Action Plan to the Agreement on African-Eurasian Migratory Waterbirds (AEWA). This requires the Agreement Secretariat in coordination with the Technical Committee and the Parties to prepare a series of seven international reviews on the implementation of the Action Plan. Amongst these seven international reviews is the Report on the conservation status of migratory waterbirds in the Agreement area (aka Conservation Status Report - CSR). The format and analytical content of the CSR is developed by the Technical Committee and approved by the Standing Committee in 2004.

Population size and trend estimates of the waterbird populations included into the Agreement are documented in Annex 1 to the CSR in a table format. The content of this table is also accessible through the WPE Portal[1]. The WPE Portal not only contains the CSR but also the global dataset for Waterbird Population Estimates (WPE). The general terms and standards applied in the WPE process are described under the Data Presentation menu on the WPE Portal. This document complements those explanations with the special regional interpretations of those terms and standards.

How to access the data

Population size and trend estimates are presented on the WPE Portal. The WPE portal serves as a depository of data from all editions of the Waterbird Population Estimates and of the AEWA Conservation Status Report from its 4th edition. Currently the portal shows data from the last global dataset, i.e. the 5th edition of the Waterbird Population Estimates published in 2012, as default.

[1] http://wpe.wetlands.org/

To show data for the **7th edition of the AEWA Conservation Status Report**, the user shall use the **Search menu** or **Start searching the database now!** Link. Select CSR7 from the **Publication** dropdown box and tick AEWA in the **Conservation framework.** Alternatively, use the following link: http://wpe.wetlands.org/search?form%5Bspecies%5D=&form%5Bpopulation%5D=&form%5Bpublication%5D=10&form%5Bprotection%5D%5B1%5D=1.

The data for the selected publication is presented in an overview table format. Explanation of the meaning and conventions related to each columns related to **Species & Populations**, **Population Estimates**, **Population Trends** and **1% threshold** are presented in the relevant sections of the **Data Presentation** menu.

On screen, the references as well as the size (start with S) and trend (start with T) notes can be read by moving the mouse pointer over the link.

Alternatively, clicking on the population name opens the population details view with all the WPE and the CSR 4th to 7th editions assessments for the population. On this screen references and notes appear at the bottom of the page, but moving the mouse pointer over the link also works.

Alternatively, click on the Print link at the bottom left corner of the page and print or save as a PDF file the whole document. In this case references and notes appear at the end of the document.

Treatment of sources

The population size and trend estimates are produced based on the collective effort of organisations participating in the African-Eurasian Waterbird Monitoring Partnership and other researchers to collect and analyse water- and seabird data. A wide range of sources ranging from trend analyses reports (e.g. EBCC et al. 2016, Wetlands International 2017), global or regional Red List assessments (BirdLife International 2015, 2017), specialised taxonomic (e.g. Scott & Rose 1996, Delany et al. 2009, Angel & Wanless 2014, Berglund & Sundberg 2014, Fox & Leafloor in prep.) or regional status assessments (Perennou et al. 1994, Solokha 2006, Dodman 2014, van Roomen et al. 2015, Sheldon 2017), action plans, articles or, occasionally, personal communications with specialists were collected and reviewed to estimate the size and trends of the 554 populations of water- and seabirds listed on Table 1 of the AEWA Action Plan.

Published population size and trend estimates were reviewed critically. If there were multiple references, the recency and quality of the data were assessed and the more recent and better quality assessments were used.

If only a single source of reference was used for the population size or trend estimate and the data is presented as in the reference, no further details are presented in the Notes fields. The user is expected to consult the reference for further details. In such cases, the

standards of the WPE Portal or described in this document were followed only as far as possible.

Taxonomy & Nomenclature

In case of the species listed in Annex II and populations listed in Table 1 of Annex III of the AEWA, the nomenclature is fully harmonised with AEWA[2].

Population Estimates

In the majority of cases, the population size is estimated based on estimates of breeding populations (e.g. European Red List of Birds) or on 'mid-winter' waterbird censuses. Occasionally, results of migration counts at bottleneck sites are also used (e.g. in case of Common Crane).

Whether data from the breeding or from the non-breeding season is used depends on

(1) When the population does not overlap with other populations,
(2) Quality and scope of the surveys in the given season,
(3) Whether the population size can be reliably deduced from auxiliary information during the overlap period.

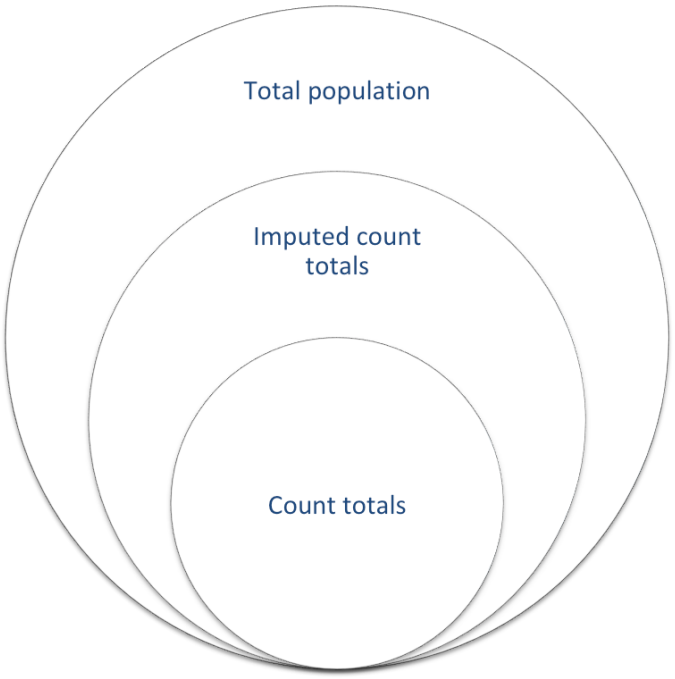
If the population does not overlap with other populations in any part of its annual cycle and other factors are equal, the following seasons are considered to be more appropriate to estimate populations size:

(1) Mid-winter or bottleneck counts: that are highly congregatory at wintering or stop-over sites and that breed at remote areas (e.g. Arctic) or are rather obscure during the breeding season;
(2) Breeding season counts: colonial breeding and dispersed breeding birds at lower latitudes, especially if only a small proportion of the population can be counted during other seasons.

If the population size can be estimated in both seasons and estimates are available, we compared the quality and scope of the available estimates.

In case of mid-winter or bottleneck counts, data from synchronised counts are preferred to sums of national estimates of seasonal maximums because the latter includes some double counting.

[2] Harmonisation of the nomenclature with the *HBW and BirdLife International Checklist of the Birds of the World*, the official taxonomic reference to the IUCN Red List, the Convention on Migratory Species and AEWA, is expected to be implemented globally in the 6th edition of the Waterbird Population Estimates.



Except for full censuses, counts include only a fraction of the population and thus represent an absolute minimum estimate of the population. Imputing and similar methods (Ter Braak et al. 1994) can account for missing counts from the site network included into the calculations and this may represent a good approximation of the total population if all or the vast majority of the population is included into the site network. However, this is rarely the case across the flyway and the proportion of the population not surveyed also need to be estimated even in countries with high coverage (see Musgrove et al. 2011). As such estimates are rarely available for the entire population, and estimates based solely on count totals or count totals accounting for missing counts can be considered only as minimum population estimates.

As extensive efforts were made during the production of the 6th edition of the Conservation Status Report in 2014 to update population size estimates using information from regional reviews (e.g. Angel & Wanless 2014, Berglund & Sundberg 2014, Solokha 2006, Dodman 2014, EEA 2014), population size estimates for the recent edition were only updated if:

- New estimates were published;
- If the population growth rate indicated that the population might have increased or decreased by more than 10% in three years;
- IWC or other counts exceeded the existing maximum estimate for the population.

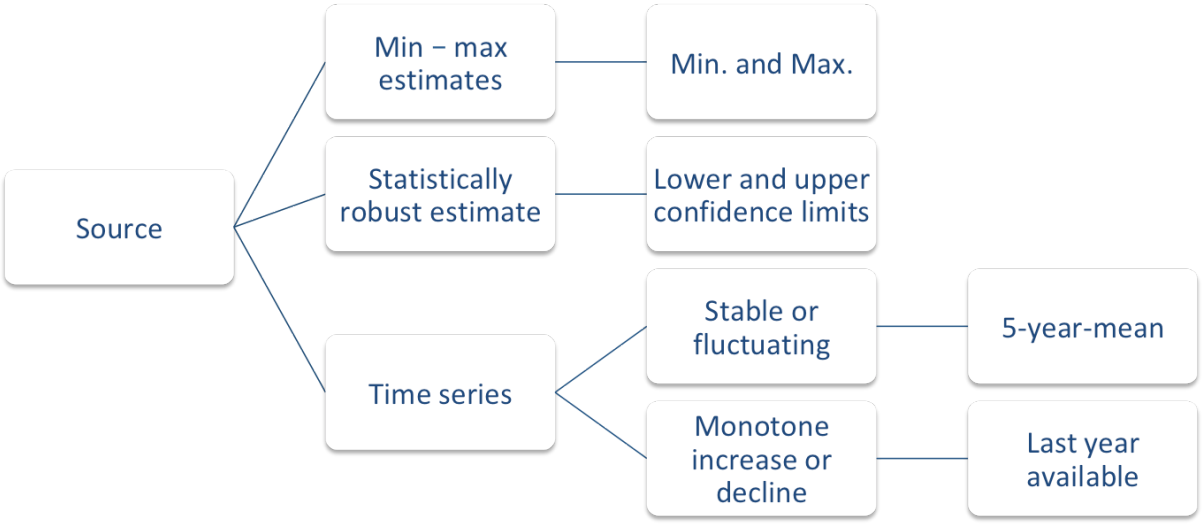
The next full update of population size estimates is planned to follow the cycle of national reporting under Article 12 of the EU Birds Directive and under AEWA.

If the source data is available only at country level, countries were allocated to flyways based on the seasonal distribution of populations and national estimates for the relevant countries were aggregated.

Minimum & Maximum

The WPE Portal suggests that entering the same value as a minimum or maximum should be avoided where possible, unless the estimate quality is accurate down to the individual bird. Nevertheless, many references provide only a single figure. We apply the following guidelines:

(1) Use the minimum and maximum estimates if only these are are available;
    (a) If the count total is higher than the minimum of the breeding estimate, use the count total as the minimum estimate;
(2) Use the lower and upper confidence limits of a population estimate based on a statistically robust estimate because this represents the accuracy of the estimate better than a single figure;
(3) If time series data is available and
    (a) The population is stable or flucuating: use the five-year-mean as a single figure;
    (b) The population is monotonously increasing or decreasing: use the number from the last year as a single figure;



Estimate Quality

The WPE Portal uses a set of quality codes. These are generally self-explanatory. We used the Best guess category, i.e. when the population estimate is only possible with large or uncertain ranges, in case of

(a) The equivalents of the former letter coded ranges (A: <10,000, B: 10,000 - 25,000, C: 25,000 - 100,000, D: 100,000 - 1,000,000, E 1,000,000)
(b) The maximum is more than twice as much as the minimum.

Population Trends

Population trends were assessed in line with the information requirements of AEWA Table 1 and the AEWA Strategic Plan. In line with the precautionary principle, results of trend analyses are reported and used in the assessment even if they are based on poor quality information unless other sources of information contradict them. This ensures that early signs of unfavourable trends are detected and acted upon precautionarily as this represents a more reversible approach than the alternative course of action (i.e. waiting until undisputable evidence is avaialble) and would lead to larger population declines before remedial actions are taken.

In general, the trend column presents the short-term (i.e. 10 years) trend which is used in the following AEWA Strategic Plan indicators:

- G.3: At least 75% of the AEWA waterbird populations have positive trend (growing or stable)
- G.4: Overall status of indicator species has improved, as measured by the Waterbird Indicator

If the source data is available only at regional level, the trend information was used only if regional level approximately matches the population.

If the source data is available only at national level, countries were allocated to flyways based on the seasonal distribution of populations and national estimates for the relevant countries were aggregated.

If no trend data is available from the last 10 years, then the trend is recorded as **Unknown**.

If the long-term trend is bimodal, the population is considered to show long-term **fluctuations** and the long-term trend is reported instead of the short-term one because this is considered to better describe the status of the population than the short-term one.

The long-term trend was also reported if the long-term period was less than 15 years, i.e. only slightly longer than the 10 years for short-term trend.

The population was considered increasing if the multiplicative growth rate was significantly larger from 1.00 and declining if it was significantly lower than 1.00. The population was considered being stable if the population growth rate included 1.00 and was lower than a species specific threshold below and above 1.00 (D^- and D^+) that corresponds to a growth rate of 25% over 25 years or 7.5 generations whichever is the longer[3].

[3] This threshold is consistent with the definition of Stable trend applied in Tucker & Heath (1994) and BirdLife International (2004) which classify the trend as Stable if the population has changed by 20% over 20 years or by 10% over 10 years/3 generations, respectively. This differs substantially from the classification of Stable as applied by Pan-European Common Bird Monitoring Scheme (EBCC et al.

If the population is not fluctuating, the short-term trend is reported.

- Trend directions are reported without a '?' mark if short-term trends from all source are statistically certain and point into the same directions.
- Trend directions are reported with a '?' mark if
    - The trend is based on unrepresentative samples (i.e. less than five years or biased scope)
    - The trend is statistically uncertain but there is a clear tendency in the data.
- Multiple trend directions are reported with a '/' if different sources report different short-term trends and none of them is considered more reliable than the other.

The short-term trend is reported as **Uncertain,** if the data show no clear tendency and the confidence limits of slope estime exceeded the ±5% range in either direction.

Start & End Year

The start and end years typically represent the period of the short term trend. As short-term trends are derived from different data sources, the trend periods can differ. The standard periods for trends based on some key references are:

- European Red List of Birds (BirdLife International 2015): 2000-2012
- Flyway trend analyses based on data from the African-Eurasian Waterbird Census from the period of 1967-2015 (Wetlands International 2017): 2006-2015

In other cases the reported start and end year reflects the information provided in the reference. If the trend period is not stated explicitely in the reference, similar approximations were used as in case of defining start and end years for the population size estimates.

The short-term trend was reported as **Unknown**, if the end year of the last available trend period is earlier than 2006. This means that trend estimates in references dated before that date were not carried forward any longer as they do not necessarily represent the short-term trend of the population.

Trend Quality

The WPE Portal provides the standard trend quality codes. During the CSR7 process these codes were interpreted further as follows:

1. **No idea:** No monitoring at international scale in either breeding or non-breeding/wintering periods. Trends unknown. This category also includes

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2016), the TRIM (Pannekoek & van Strien2005), TrendSpotter (Soldaat et al. 2007) and MSI (Soldaat et al. 2017) statistical packages, which all define stable as no significant increase or decline, and most probable trends are less than 5% per year, which represents doubling or halfing in 15 years (Soldaat et al. 2007), which is more consistent with the threshold for the Vulnerable Red List category (30% decline in 10 years/3 generations) than with a truly stable population. However, the ±5% range reflects rather well the typical fluctuations in bird monitoring data.

populations where trends are statistically uncertain unless other evidence allows estimation of the trend.

2. **Poor:** Some international monitoring in either breeding or wintering periods although inadequate in quality or scope. Trends assumed through partial information.
    a. Assumed based anecdotal information or based on habitat change;
    b. Very small sample size (sample from < 50% of the seasonal range states or covering <10% of the estimated population)
    c. Unrepresentative coverage;
    d. Short-term trend based on <5 years of data
3. **Reasonable**: International monitoring in either breeding or non-breeding/wintering periods that is adequate in quality or scope to track direction of population changes.
    a. Trend is statistically uncertain.
    b. Different sources provide different trend direction
4. **Good**: International monitoring in either breeding or non-breeding/wintering periods that is adequate in quality or scope to track direction of population changes with defined statistical precision.
    a. Trend is statistically certain.

Notes

Listing populations in Categories 3b, 2b of Column A and B respectively of AEWA Table 1 requires the assessment whether the population is in significant long-term decline or not. This is measured as at least 25% decline over 25 years or 7.5 generations whichever is the longer (see AEWA Resolution 5.7). Because of its importance for classifying populations in AEWA Table 1, it is always pointed out in the Note field

- If a population is in significant long-term decline or;
- If evidence shows that it is no longer in significant long-term decline.

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