AEWA Waterbird Trend Analysis Methodology Review

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Summary

This project was undertaken for JNCC through an external contract carried out by Highland Statistics. This document sets out the initial requirements and scope of the AEWA Waterbird Trends Analysis project and is intended as a preface to provide context for the accompanying report, which presents a detailed statistical methodology analysis. The full report is available on the JNCC Resource Hub.

1. Project Aims and Objectives

1.1 Project Aims

The project aims to review the current methodology used to assess waterbird population trends from the International Waterbird Census for the Conservation Status Report for AEWA (Agreement on the Conservation of African-Eurasian Migratory Waterbirds) and to develop and test an alternative statistical approach.

1.2 Project Background

The Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) is an intergovernmental treaty focussed on the conservation of migratory waterbirds and their associated habitats across their entire migratory range. This includes parts of Africa, Europe, the Middle East, Central Asia, Greenland and the Canadian Archipelago. Further information can be found on the AEWA website. As of July 2020, 80 countries and the European Union are Contracting Parties to AEWA. These Parties are engaged in cooperative agreement to undertake coordinated conservation and management of 225 species of migratory waterbirds throughout their ranges. As part of this, AEWA produces a Conservation Status Report (CSR) every three years. This includes an assessment of waterbird population trends and is produced by *Wetlands International* under contract from AEWA. The CSR is fundamental in determining the conservation regimes applicable to AEWA-listed waterbird populations by Contracting Parties.

To assess population trends for the CSR, *Wetlands International* currently analyses the International Waterbirds Census (IWC) data using the TRIM approach (Pannekoek & Van Strien, 2001) and following a modified version (Wetlands International, 2017), in line with the advice given by Sovon, Dutch Centre for Field Ornithology (van Roomen et al., 2011). However, it is known that this approach has some shortcomings. Consequently, the project will undertake a review of the existing method and subsequent development of a more appropriate approach. It is anticipated that this will provide a more statistically-robust population analysis for the CSR. The outputs of this project will serve as an evidence base for informing and enhancing the methods used by *Wetlands International,* and will be utilised in producing the 9th Edition of the Conservation Status Report (2023), which will be submitted to the AEWA Meeting of Parties (MoP) in 2024.

1.3 Project Objectives

To meet the overall aim of this project (Section 1.1), the objectives are to:

- Review the current IWC trend analysis procedure and assess shortcomings
- Develop an alternative, statistically-robust methodology for assessing waterbird trends at national- and population-level
- Test and demonstrate the alternative approach on two pre-defined AEWA populations

1.4 Project Objectives: Detailed Tasks

In order to achieve the objectives detailed in Section 3 above, the following tasks will be undertaken:

1. Undertake a detailed review of the existing IWC population trend analysis as used in the AEWA CSR. The TRIM approach is known to be sub-optimal, because waterbird data are not Poisson-distributed. TRIM ignores spatial autocorrelation and the year effect assumption leads to overestimations. These shortcomings are less serious in regions with small amounts of missing data but are more significant where data is sparse. The review will be undertaken through interaction with *Wetlands International* (facilitated by JNCC) who can provide detailed insights into the existing assessment process. This phase will assess the overall fitness-for-purpose of the methods currently used.

2. Following from the first task, there is an expectation that a more robust approach to population trend analysis should be considered. The second phase of the work will develop a suitable alternative statistical method for assessing population trends at national- and population-level. This should draw on use of established methods, evidenced as appropriate through citations to underpinning scientific literature. The zero-inflated negative-binomial general linear or general additive models have been identified as potentially suitable approaches. However, further commentary on this is welcome.

3. The developed methodology will be tested and assessed through implementation on two AEWA waterbird populations. These populations will be selected from regions where the performance of the existing methodology is considered to be weaker. Datasets will be provided through *Wetlands International*.

It is anticipated that the outlined work will draw on existing, established approaches, although the application of these methods to waterbird population analysis may be novel.

2 Dissemination

The outputs of this contract are JNCC products and shall not be published or disseminated without the written permission of JNCC. All material supplied as part of this contract shall remain copyright of JNCC. In recognising the likely wider contribution of this report in the public domain, all reasonable requests for scientific publication based on the outputs will be supported.

References

Pannekoek, J. and Van Strien, A. 2001. *Trim 3 Manual (TRends & Indices for Monitoring data)*. Statistics Netherlands.

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