

Waterbirds in the Wadden Sea - New Steps in the Trilateral Cooperation on Data Exchange, Management and Analysis.

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Introduction

The so-called Meltofte report (Meltofte et al. 1994) is a milestone in presenting data on migratory waterbirds in the Wadden Sea. For the compilation and analysis of migratory bird data from all Wadden Sea Countries (Denmark, Germany [Schleswig-Holstein, Lower Saxony], The Netherlands) under the responsibility of the Joint Monitoring Group of Migratory Birds in the Wadden Sea (JMMB) as well as for the method to fill gaps of missing counts (imputing), several rounds of talking and cooperative work had been necessary and fruitful. Three kinds of data were presented in that publication: 1) distribution and 2) total numbers of birds from data of total and (in the Wadden Sea) synchronized counts, 3) phenological data from selected sites with good counting coverage. The calculation of trends has not been performed for the entire Wadden Sea. However, trends have been eyeballed from the results of the total counts.

Harmonized Data Management

The Meltofte report also helped in harmonizing counting programs (Spring-Tide-Counts) and counting dates in the Wadden Sea countries. This led to a more coherent data collection than had been in existence before and we may say that since 1992 we have gotten increasingly more and better data about the waterbirds using the Wadden Sea. As a start of a new, frequent Wadden Sea report series, two more reports about new datasets from the same area have been published since then. Rösner et al. (1994) used the same methods, whereas Poot et al. (1996) implemented the usage of more sophisticated methods (UINDEX, see below) for the analysis. Again, only January data (synchronous counts of the entire Wadden Sea) have been used to eyeball or calculate trends.

Considering the growing amount of 'good' data, the improvised methods of filling gaps and, consequently, the lack of trend analysis was not tolerable anymore. More sophisticated methods have become available and more emphasis can be laid on trends in other months of the year. It was a logical step that the four parties agreed to do better justice to these data.

In 1998, it was decided by JMMB to harmonize the data exchange, data handling methods and data analysis methods within the Wadden Sea countries. This harmonization was considered necessary for several reasons:

- frequent exchange of data created too much work since different parties requested different formats and information,
- the methods of imputing (i.e. filling gaps of missing counts) must be improved and harmonized within the Wadden Sea countries,
- in addition to the analysis on the national level, imputing should be performed with the entire Wadden Sea data,
- trend analysis must be based on a harmonized dataset of the entire Wadden Sea.

Trilateral Workshop on Data Handling and Analysis Techniques

Delegates from the JMMB as well as members from the national data teams (data experts) came together in a two-day workshop, held at SOVON in Beek, NL, in September 1998. Cor Berrevoets (RIKZ, NL, National Institute for Coastal and Marine Management) provided background information on the usage of data-handling and analysis techniques. In preparation for the workshop, data from all parties on three selected species had been sent to C. Berrevoets to help understand the unique situations in each country. During the workshop, each party presented their own data management procedures. Also, presentations were made on:

Trend Analysis

Different, currently available, program packages for trend analysis were introduced.

Most experiences with waterbirds are available with the UINDEX4 package (Bell 1995), a method for estimating population index numbers (Underhill 1989, Underhill & Prys-Jones 1994). Here, a number of models are available to describe the data and perform imputing. The models include a year factor (trend), a month factor (phenology) and cluster factor (importance). Iterative calculations gain the best fit at a global (regio-

nal) level or a local (site) level. Index numbers present a trend. However, no 'true' confidence limits can be calculated but consistency limits are given. The latter have little, or no, statistical background.

TRIM (Trends & Indices for Monitoring data) (Pannekoek & van Strien 1996): A major flaw is that it cannot include month factors. Thus, the power of using phenological patterns for the analysis is not available.

GLM (General linear modeling): Available in several statistical packages. So far, the tests showed that they need some more computer time and require more statistical knowledge. However, as time proceeds, those methods will become more and more easy to use and, thus, attractive.

In order to fill gaps of missing counts, as well as to reduce variation in the datasets, several methods of pre-analysis manipulation of data were considered necessary - the clustering of sites and the estimation of important sites.

Clustering of Sites

This procedure identifies ecological units, i.e., a group of counting sites within which a species, or a group of species, have regular interchange (on a day to day basis). The size of a cluster is linked to, the so-to-speak, 'homerange' of a species. For instance, groups of Oystercatchers have a relatively small area where they roost, feed etc., whereas, Knots may distribute themselves over large areas. The clustering of sites reduces variation in the combined data. It also makes it possible to find out, which sites contribute considerable to a species count and which do not. This is an important decision in the estimation of important sites (see below).

Estimation of Important Sites

This procedure identifies those sites which are important enough to influence the trend. The importance of sites may be marked as "Importance within a cluster" or "Importance within a region" (e.g., country, Wadden Sea). When a site holds an important number of individuals of a certain species, it is marked as an important site for that species.

If a count from an important site within a cluster is missing, the count of the entire cluster will be marked "incomplete - important data missing" and handled in the trend analysis accordingly.

If a count of a non-important site is missing, the cluster count will be handled as complete.

On the successively higher levels (region, Wadden Sea), the same rules apply.

Trials with Oystercatcher data from the Dutch Delta had revealed a 1%-importance level on the site-regional level and 5% of the site-cluster level.

The results of the trilateral workshop and the cooperation between the parties are promising. However, in order to guarantee and facilitate the continuity of the cooperation, as well as the harmonization of the analysis methods, several steps have been taken.

Data exchange format

A data exchange format has been agreed between the parties. It will be used to exchange data between the data teams. The national data teams have different tasks leading to the next publication of migratory waterbirds data of the Wadden Sea. They will use the data exchange format for their data requests. This solution is considered better than, e.g., creating a central database somewhere from which each party will extract what it needs.

Toolbox for data handling and analysis

A toolbox is in development (under the guidance and with the finances of Lower Saxony) to perform several steps from data exchange to data handling to trend analysis. The toolbox will be designed to work with any computer system; it will offer an interface, which guides the user through the different steps of the analyses.

The existence of such a toolbox will serve several purposes:

- guarantee that data are analyzed using exactly the same methods
- do the work once at one place instead of having four data teams doing the work at four places
- be a central point at which new methods can be implemented and made available to all parties.

Finally, this whole process aims at a new standard in Wadden Sea reports on migratory birds in the framework of JMMB. A thorough assessment of trends can be made along with an improved data exchange and analysis between the participating countries. Moreover, we feel that this approach may serve as an exemplary cooperation and will, eventually, lead to a broader international discussion on data analysis and imputing methods.

It is planned to also cooperate with UK scientists, as well as other institutions/countries, that currently work on similar bird-data sets.

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