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Wild birds as indicators in Europe: latest results from the Pan-European Common Bird Monitoring Scheme (PECBMS)

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Abstract – The main goal of the Pan-European Common Bird Monitoring Scheme is to produce policy-relevant indicators of the general state of biodiversity using scientific data on changes in breeding populations of common birds across Europe. In the third set of European indices presented here, we summarise population trends of 124 widespread terrestrial species. Information was derived from annual national breeding bird surveys, spanning different periods, from 20 European countries. At a European scale, the 2007 update of indicators shows that common birds are in moderate decline, with populations having fallen by 14% over the last 25 years. Over the same time period, common farmland birds have crashed, falling by 44%. Agricultural intensification is thought to be the main driver of this decline. The trends of common forest birds, which have declined moderately by 9% in Europe, show marked regional differences. While on average populations have been stable in the west and east of Europe, they show considerable declines in the north, where forest birds are thought to be threatened by highly intensive forestry exploitation, and in the south, where possible threats are more uncertain. Further research is planned to improve our understanding of the species trends patterns and their drivers.

INTRODUCTION

The World Summit on Sustainable Development in 2002 set targets to significantly reduce the rate of biodiversity loss by 2010 at global, regional and national scales. At a European and EU level the target is even more strict - to *halt* biodiversity loss by 2010. There is thus an urgent need to monitor biodiversity to be able to assess whether the targets are being met or not.

The trends in abundance and distribution of bird species could serve as an example of suitable bio-indicators. Birds are widespread, diverse and mobile and live in most habitats. They are relatively easy to identify, survey and census. Because of their high position in food chains, they are sensitive to land use (e.g. Donald *et al.* 2001) and can, in some circumstances at least, faithfully reflect trends in other biodiversity. Several studies have shown parallel declines of birds and other biodiversity in the countryside (e.g. Robinson and Sutherland 2002 - reptiles, amphibians, plants, invertebrates, van Strien *et al.* 2004 - butterflies). Realistic data on bird populations are almost inexpensive to collect and analyse and information over a long time period is available, at least from several regions. There is a number of proven methods of analysis of survey data available. Finally, birds are popular and have a resonance with both the public and decision makers alike.

On the other hand, there are some weaknesses associated with wild bird indicators. Birds are much less specialised in micro-habitat use than other taxa, because they are operating at a larger scale. They are highly mobile compared to other taxa and may be influenced by many migratory effects from very different areas in their range. Bird species can show a variety of responses to environmental change - some can even benefit from anthropogenic damage. Due to these factors, bird trends may not necessarily correlate with those of other taxa. It should also be kept in mind that populations are likely to respond to an integrated set of factors rather than a single simple factor and com-

mon bird indicators may be relatively insensitive to environmental change - only reflecting large-scale pervasive effects. Therefore, the bird indicators need to be composed carefully in order to achieve sensible and useful figures.

The Pan-European Common Bird Monitoring Scheme (PECBMS) is a joint initiative led by the European Bird Census Council (EBCC) and BirdLife International. It aims to combine population trend data from annual national breeding bird surveys to produce policy-relevant indicators for different habitats. The PECBMS started in 2002, with the first set of indicators released in 2003, and the second set in 2005 (PECBMS 2006). In this paper we present the main outputs of the last update in 2007.

METHODS

The main partners of the PECBMS are the EBCC, RSPB, BirdLife International and Statistics Netherlands. The project has established a large European network of collaborators - coordinators of national or regional monitoring schemes, EBCC delegates and/or BirdLife partners. The project is coordinated by a central coordination unit based at the Czech Society for Ornithology (CSO) in Prague, Czech Republic. A Steering Group and Technical Advisory Group oversee the work.

National monitoring schemes are based on fieldwork by skilled and trained volunteers, who deliver data to the scheme coordinators. National species indices are calculated by national coordinators annually using the TRIM software package (Pannekoek and van Strien 2001), which allows for missing counts in the time series and produces unbiased yearly indices and standard errors using Poisson regression. The national indices are then combined by the central coordination unit and by Statistics Netherlands into supranational indices for species, weighted by estimates of national population sizes. Weighting allows for the fact that different countries hold different proportions of each species´ European population. Updated national and European population size estimates were derived from BirdLife International (2004). For details on the method of combining national indices into supranational indices, see Van Strien *et al*. (2001). Supranational indices were then combined into multispecies indices - the European "indicators" (Gregory *et al.* 2005, www.ebcc.info/pecbm.html).

Data for the 2007 update comes from twenty ongoing national breeding bird monitoring schemes, covering the period 1980 to 2005. There are several new monitoring schemes that are currently being developed in Europe with EBCC and PECBMS assistance, and which are now in the pilot stage (e.g. in Romania, Greece and Slovenia), although they are not yet ready to provide data into the PECBMS dataset. These new schemes still need further development and financial assistance to be able to provide trend data for indicator updates in the future.

The point count survey method is used by national monitoring schemes in Europe, although line transects are also used frequently. Free choice of plot selection is still used by some national schemes, but more desirable are stratified random or semi-random plot selections that have become more widespread in their use. More details about the national schemes are given in a study conducted in the 2006/2007 winter, that reviewed the national bird monitoring schemes (Klvaňová and Voříšek 2007), involving the distribution of detailed questionnaires to 40 European countries. The outputs of the review are available in the section entitled "European bird monitoring schemes" on the EBCC website (www.ebcc.info/pecbm.html) as a living document, which is regularly updated.

Species characteristic of main habitat types have been classified using an improved procedure that was accepted at the PECBMS workshop in Prague in 2005. To reflect regional variation, this procedure is based on assessments within four main biogeographical regions: Atlantic, Boreal, Continental and Mediterranean. Regional coordinators were responsible for producing the regional species lists in cooperation with other experts. Species selection was based on birds being: (1) abundant and widespread - species with > 50,000 breeding pairs in Europe; (2) characteristic of farmland or forest, or other common species in Europe and per bio-geographical region using an assessment of predominant regional habitat use. In each case, characteristic species are those where ≥ 50% of the European or regional population uses a particular habitat for breeding or feeding. Resultant regional species classification is used in the graphs of the regional indicators in this paper. Regional assessments were then combined to create a single European species classification. Currently, we focus on two major habitats: boreal and temperate forests (~30% area of continental Europe) and agricultural and grassland habitats (~50% area) (Tucker and Evans 1997). More detailed rules on the species selection by habitat type and biogeographical region as well as regional versions of the indicators based on either regional or single European classification can be found on http://www.ebcc.info/pecbm.html.

RESULTS

In 2007 the indicators produced using improved European species classification based on the biogeographical ap-

Table 1. The long-term trends of common birds in Europe, European species classification, 1980 to 2005.

Trend classification	**all** (124 species)* (%)	**farmland** (23 species)** (%)	**forest** (27 species)*** (%)
strong increase	0.8	0	0
moderate increase	22.6	8.7	18.5
stable	21.8	8.7	33.3
moderate decline	43.5	65.3	44.5
steep decline	1.6	4.3	0
uncertain	9.7	13	3.7

Trend classification:

The multiplicative overall slope estimate in TRIM (Pannekoek and van Strien 2001) is converted into one of six categories. The category depends on the overall slope as well as its 95% confidence interval (= slope +/- 1.96 times the standard error of the slope).

- Strong increase - significant increase of more than 5% per year (5% would mean a doubling in abundance within 15 years). Criterion: lower limit of confidence interval > 1.05.
- Moderate increase - significant increase, but not significantly more than 5% per year. Criterion: 1.00 < lower limit of confidence interval < 1.05.
- Stable - no significant increase or decline, and it is certain that trends are less than 5% per year. Criterion: confidence interval encloses 1.00 but lower limit > 0.95 and upper limit < 1.05.
- Uncertain - no significant increase or decline, but not certain if trends are less than 5% per year. Criterion: confidence interval encloses 1.00 but lower limit < 0.95 or upper limit > 1.05.
- Moderate decline - significant decline, but not significantly more than 5% per year. Criterion: 0.95 < upper limit of confidence interval < 1.00.
- Steep decline - decline significantly more than 5% per year (5% would mean a halving in abundance within 15 years). Criterion: upper limit of confidence interval < 0.95.

* long-term trend for four species from 1982 to 2005 and for 17 species from 1983 to 2005
** long-term trend for five species from 1982 to 2005
*** long-term trend for three species from 1982 to 2005 and for one species from 1983 to 2005

proach (www.ebcc.info/pecbm.html) resulted in 33 species classified as common farmland birds, 28 as common forest birds, and 63 other species regarded as habitat generalists or specialists of other habitat types.

Updated indices and trends were produced for 124 species; of these 56 have declined (45%), 29 have increased (23%) and 27 have remained stable (22%). The trends for twelve species (10%) were classified as uncertain, mainly due to the lower quality of data (for more detailed habitat-specific information see Table 1).

The data analysis confirmed that farmland birds are in decline throughout Europe - the indicator of European common farmland birds shows a decline of 44% between 1980 and 2005 (Fig. 1). Five of the ten common European species showing the greatest declines are species characteristic of agricultural habitats, including grey partridge *Perdix perdix* and northern lapwing *Vanellus vanellus* (see also PECBMS 2007).

A comparison of the new European Union (EU) Member states that joined the EU in May 2004, and old EU Member states shows that, although farmland birds were performing better in the new EU countries, their trends appear to be worsening in recent years, now mimicking the trends in the old EU countries (Fig. 2).

Although the multispecies indicator for common forest birds in Europe has also declined, it is much less than the decline shown by common farmland birds (Fig. 1). Another difference emerges on the regional level. The common farmland birds declined in all four European regions (Fig. 3), whereas the common forest birds trends exhibit different patterns across regions. They are declining most in northern and also in southern Europe while showing stability in central and eastern Europe (Fig. 4).

All outputs, including details on the methods, are available at www.ebcc.info/pecbm/html.

DISCUSSION

The latest analysis of European species trends highlights the sharp decline of common farmland birds. This decline provides more evidence that increased specialization and intensification of agricultural methods, in particular, is contributing to the loss of biodiversity on European farm-

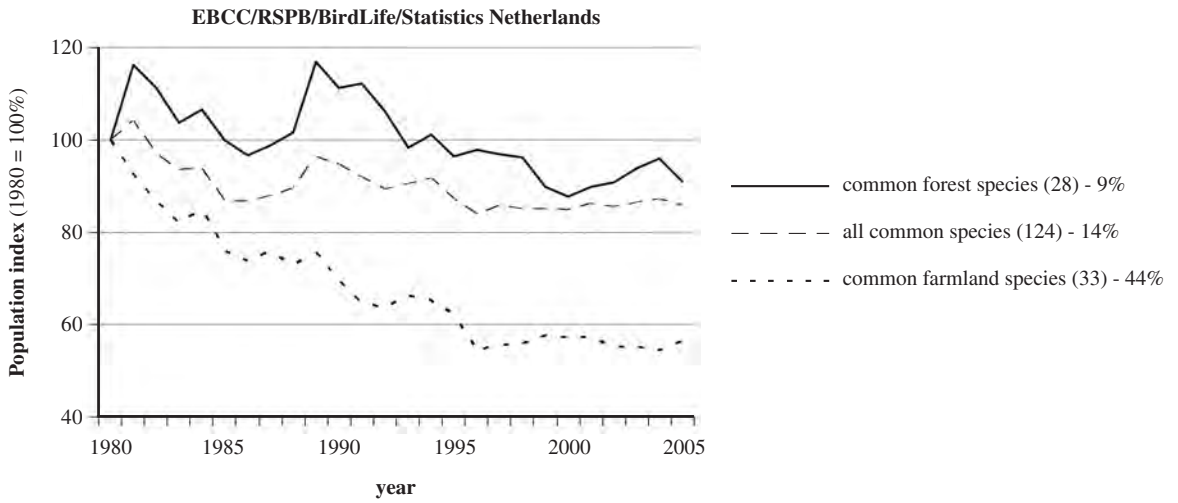

Figure 1. The wild bird indicator for Europe based on the population trends of common breeding birds, European species classification, 2007 update. The numbers in parentheses show the numbers of species in each indicator. For the lists of species contributing to each indicator see www.ebcc.info/pecbm.html.

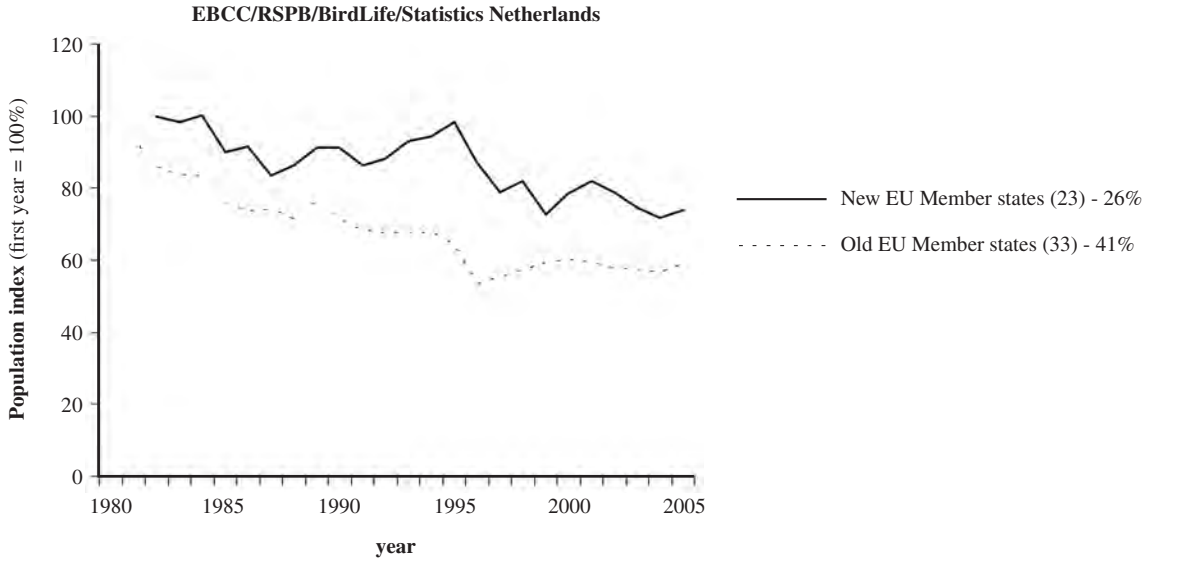

Figure 2. The farmland bird indicator for the EU countries, European species classification. Trends for the new EU countries are available from 1982 to 2005. The numbers in parentheses show the numbers of species in each indicator. The new Member states that joined the EU in May 2004 are Czech Republic, Estonia, Hungary, Latvia and Poland; the old Member states are Austria, Belgium, Denmark, Finland, France, Germany, Italy, Ireland, Netherlands, Portugal, Spain, Sweden and UK. For the lists of species contributing to each indicator, see www.ebcc.info/pecbm.html.

land (Vickery *et al.* 2004, Krebs *et al.*1999, Pitkanen and Tiainen 2001)

While farmland birds have declined throughout Europe, the decline in forest birds is concentrated in two out of the four European regions. The explanation appears to be that since there is no single policy driver for forests in Europe, as there is for farmland, different factors may be involved. There is a large body of research that shows that some bird populations in northern Europe are threatened by intensive forestry exploitation (Virkkala 1987, Virkkala 1990, Virkkala 1991, Angelstam and Mikusinski 1994, Kouki and Vaananen 2000).

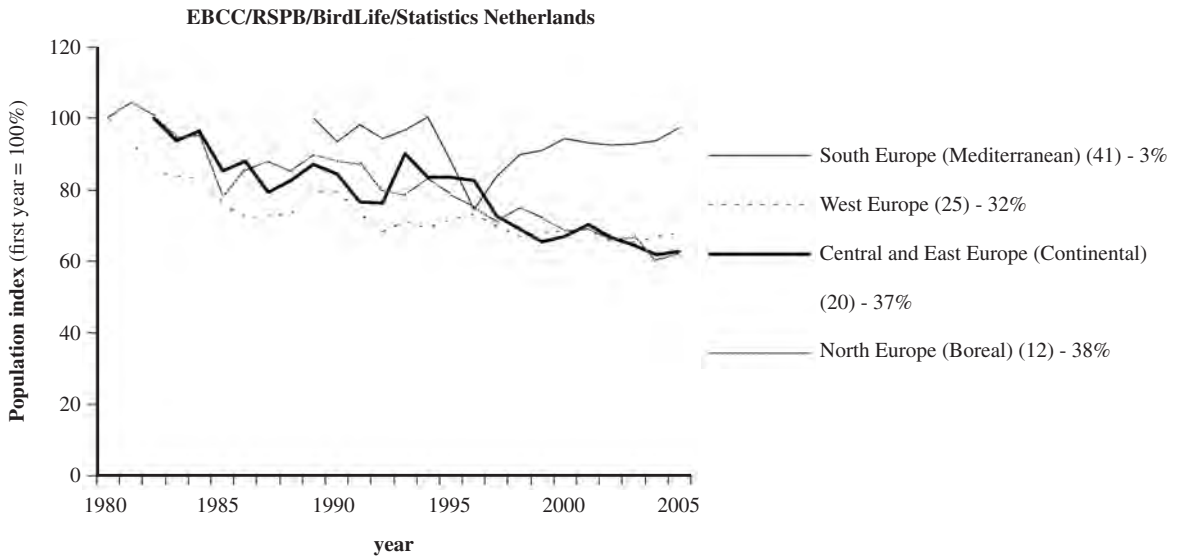

Figure 3. Regional indicators of common farmland birds in the four European regions, biogeographical regional species classification. The numbers in parentheses show the numbers of species in each indicator. For the lists of species contributing to each indicator, see www.ebcc.info/pecbm.html.

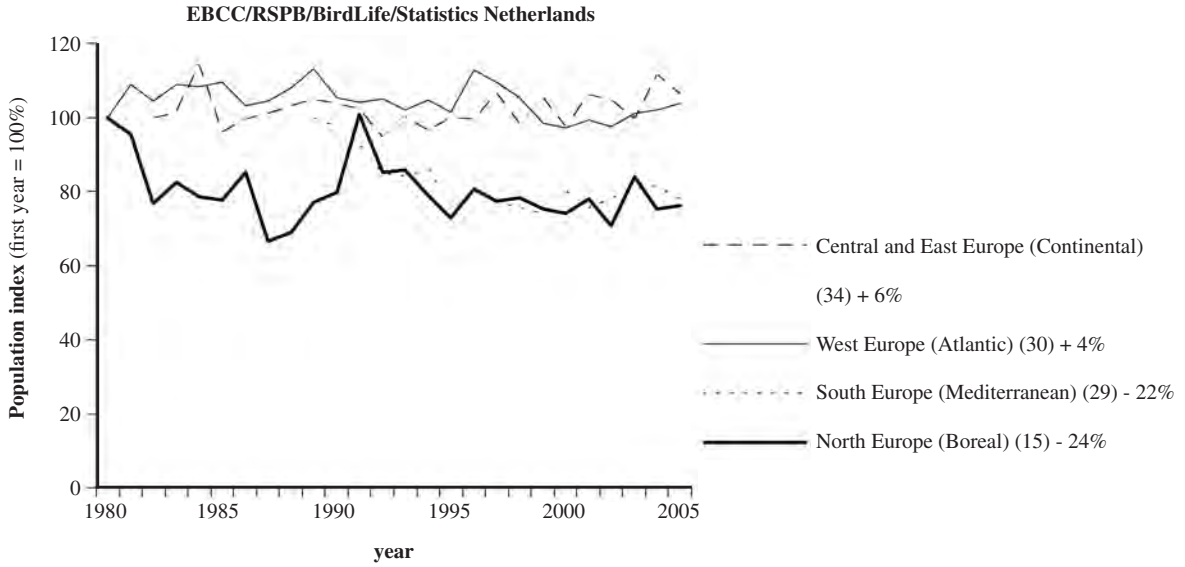

Figure 4. Regional indicators of common forest birds in the four European regions, biogeographical regional species classification. The numbers in parentheses show the numbers of species in each indicator. For the lists of species contributing to each indicator, see www.ebcc.info/pecbm.html.

In southern Europe, where the trends are much more uncertain because of the relatively short time series of available data, wild fires and unregulated logging might be the main threats of common forest bird populations, but this is speculation.

This 2007 update covered a larger amounts of data and, as a result, the European trends of several species were produced for the first time (PECBMS 2007). Apart from a greater robustness and higher quality of indicators, it is perhaps surprising that declines of particular species were found, such as meadow pipit *Anthus pratensis* and crested tit *Parus cristatus*. It may be that these species, although

considered as Secure at the European level (BirdLife International 2004), are showing signs of declines that could require further study.

The PECBMS project is an example of successful international cooperation in applied conservation science, which is communicating information on biodiversity trends in Europe.

The European wild bird indicator has attained a certain level of success so far. It has had a very high impact across Europe and is used in a wide range of environmental reporting processes in Europe and also globally. Data on common birds are used in the European Environment Agency's (EEA) core set of indicators as well as in the Streamlining European 2010 Biodiversity indicators set. The Farmland Bird Index is used as an official European Union Structural, and Sustainable Development Indicator (http://epp.eurostat.ec.europa.eu), it is part of the agri-environment indicator set, and is used as an indicator to underpin the Rural Development Regulations. There is, however, further effort needed to help develop the project in the future. We aim to publish updates on a regular annual basis, improve geographical coverage, increase the number of species and explore the possibility of producing indicators for other habitats, e.g. urban or inland wetlands and for climate change. We also plan to intensify the scientific research to reveal the main driving forces behind the species trends.

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