



## Original articles

# Tiny terminological disagreements with far reaching consequences for global bird trends



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## ABSTRACT

Various combinations of data and expert opinion have been used to select species for indices of bird trends. Commonly these indices break species into groups based on their habitat preference such as woodland specialist, farmland specialist and generalist birds. It is unclear what influence differences in how species are allocated to these groups might have on trends in these indices. There is uncertainty surrounding reported trends in these bird groups with studies variously showing declines or increases in prevalence. This is usually attributed to ecological factors but if studies classify bird groups differently this variation may be due to inconsistency in classification. Disagreement about whether these bird groups are stable, increasing or declining has the potential to obscure important changes in bird prevalence and impede appropriate, timely conservation.

We examined how consistently European and Australian researchers classified woodland, farmland and generalist birds, and whether this affected the trends in indices of these groups. Researchers from both regions classified species differently, and the population trends seen in these groups were strongly affected by differences in classification. While all classifications we studied suggest that populations are consistently declining for Australian woodland and European farmland birds and increasing for European woodland birds. European generalist and Australian farmland and generalist birds may be seen as increasing or decreasing in prevalence depending on classification.

Our results question the current practice of idiosyncratically classifying indicators in scientific research and conservation. Current practice is making it more difficult to infer whether, when and how to preserve bird groups in Europe and Australia, potentially leading to sub-optimal biodiversity outcomes. We offer suggestions for building consensus on how to classify these bird groups in order to provide more reliable evidence to support conservation decisions.

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## 1. Introduction

Globally, governments are united in the desire to preserve Earth's remaining biodiversity, as evidenced by the creation of the Convention on Biological Diversity and the Aichi targets, along with other commitments made at national and regional scales. Attempts to gain an understanding of global biodiversity trends have inspired the creation of numerous biodiversity indicators (Tittensor et al., 2014). These indicators are restricted to specific taxa, areas, or aspects of biodiversity loss (Cairns et al., 1993; EBCC, 2014; Gottschalk et al., 2010; IUCN, 2000; Scholefield et al., 2011).

Birds are particularly charismatic and diverse and as a result have been extensively studied and monitored, eventuating in the

development of multiple indicators of their trends through time (DEFRA, 2013; EBCC, 2014; Gregory and Van Strien, 2010; Olsen et al., 2005; Rayner et al., 2014). These indicators typically group birds by their primary habitat association to pick up changes associated with habitat modifications. However, Fraser et al. (2015) indicated that the species included in these groups differ between studies. The study, based in Australia, found that the species experts classify as woodland birds differ substantially and may lead to meaningful differences in results. However, an English study found that the indicators of bird trends derived from the Breeding Bird Survey were robust to changes in species classification (Renwick et al., 2012). Our study aims to compare how sensitive bird indices in Europe and Australia are to differences in species classification demonstrated in the literature. We look at how indices of trends in bird groups differ under published classifications of farmland, woodland, and generalist bird groups. If indices of trends in these bird groups differ substantially then results from different stud-

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ies are not comparable. This impedes scientific progress because researchers can no longer justify drawing conclusions from the body of research on farmland, woodland or generalist birds, only from the minority of article which classify species identically. This is problematic in all research but especially in conducting systematic reviews and meta-analyses as it thwarts the direct comparison of results between studies. Disagreement about trends in a bird group between studies may obscure declines causing necessary conservation efforts to be delayed or deemed unnecessary.

Researchers and conservationists throughout Australia and Europe are concerned that forest and woodland birds are declining due to deforestation, fragmentation and degradation of forests and woodlands (Ford et al., 2001; Gil-Tena et al., 2009; Gregory et al., 2007; Hewson et al., 2007; Vickery et al., 2004; Watson, 2011). The reduced amount of habitat available and the increased need to disperse through hostile environments are thought to lead to declines in forest and woodland birds (Deconchat et al., 2009; Garrard et al., 2012; Gil-tena et al., 2014). The relationship is complicated in Europe because in areas such as Britain woodland habitat is receding while in some Mediterranean countries it is expanding.

In Europe there is also concern about a possible decline in farmland birds as a result of reductions in the extent and quality of remaining traditional farmland habitats. This decline in farmland habitats is thought to have been triggered by the European Union's Common Agricultural Policy which had a two-fold effect: intensifying agricultural practices and indirectly increasing afforestation (Pithon et al., 2005; Vanhinsbergh et al., 2002; Vickery et al., 2004). In 2003, the European Common Agricultural Policy was revised to address this (Butler et al., 2010) and, along with the promotion of agri-environmental schemes, this effort may have redressed the issue but declines in farmland birds continue to be reported (Aviron et al., 2009).

Declines in farmland and forest/woodland birds are thought to be accompanied by increases in species which have broader habitat requirements (the generalists) and are able to persist in modified areas (McKinney and Lockwood, 1999). It is hypothesised that there is a global rise in the population of generalist birds as a result of biotic homogenization caused by extinctions, habitat degradation, urbanization and introduced species (Crocì et al., 2008; Gregory and Van Strien, 2010; McKinney, 2006; Robertson et al., 2013; Rooney et al., 2007). There is also evidence that common bird species (mainly generalists) are declining in Australia (Birdlife Australia, 2015) but more evidence is required in Europe and Australia to conclude that there is an increase in generalist birds.

In this study we examine whether the proposed trends in three bird groups (woodland specialist, farmland specialist and generalist) are robust to classification according to different published sources. Evidence from Fraser et al. (2015) demonstrated that the classification of Australian woodland birds is problematic and in this study we aimed to extend their research by investigating whether: (i) inconsistent classification is problematic for other well studied bird groups, (ii) European researchers classify species more or less consistently than Australian researchers and, (iii) inconsistent classification of species substantially impacts the interpretation of indices of trends in bird groups.

## 2. Materials and methods

The terminology used to identify groups of bird species varied between and within regions. We accounted for this difference by defining each group explicitly.

**Farmland specialists:** These species are thought to specialise in agricultural areas with low density to no trees and an abundance of grasses, forbs or crops. They may include shelterbelts or hedgerows.

Terms often used in the literature to describe these species were 'farmland', 'open country', 'hedgerow' and 'savannah'.

**Woodland specialists:** These species are thought to specialise in with areas with a treed over-storey. Terms often used to describe these species in the literature were 'woodland', 'woodland-dependent', 'forest' and 'woodland/forest'.

**Generalists:** These species are characterized by lacking dependence on a particular habitat type. In the Australian bird literature studies often consider 'woodland' and 'open country' specialist species and 'open tolerant' species which inhabit both habitats. In that context, we consider the term 'open tolerant' to refer to generalists. Other terms used to describe this group were 'generalist' and 'ubiquitous'.

Hereafter we refer to the terms 'farmland', 'woodland' and 'generalist' species for the sake of simplicity. We determine how consistently birds are being classified as woodland and farmland specialist and generalist species and investigate the influence any inconsistency has on the trends in indices of abundance and reporting rate of these groups. To do this we use the index of yearly multiplicative trend which is used to report bird trends by the European Bird Census Council (EBCC) (EBCC, 2014) (Fig. 1).

### 2.1. Data sourcing

The results from two systematic reviews were combined for this study; one collected data on woodland and farmland specialist and generalist birds internationally, the other augmented the data with additional records from Australia which was poorly represented in the initial search.

The first review searched several databases (Elsevier, JSTOR and Wiley online library, SCOPUS and Web of Science), for articles including the terms 'woodland bird'; 'woodland' and 'bird'; "forest bird"; forest' and 'bird'; 'farmland bird'; 'farmland' and 'bird'; 'open country bird'; 'open country' and 'bird'; 'generalist' and 'bird'; and "ubiquitous" and 'bird'. The search returned 2593 articles. Articles focused on non-avian species or communities, single or pairs of species were removed after which 439 articles remained. The articles which specified at least two groups of bird species were retained for further analysis (e.g. generalist and farmland birds). Studies which only considered a single category were excluded to avoid confounding the species that did not fall into the category of interest with those that were not seen during the study. This new search yielded 37 articles from Europe, one article from Australia (Appendix A in Supplementary material), four from Africa, three from Asia, five from South America and four from North America.

Previous research in (Fraser et al., 2015) had identified a body of research surrounding Australian woodland birds. We used their search to augment our dataset subject to the above exclusion criteria. Articles from Africa, Asia, North America and South America were discarded due to low sample size.

The data was analysed in two ways (Fig. 1). First, by analysing the level of inconsistency in the classification of bird species on two axes using the full range of articles gathered using the systematic review: farmland specialist – woodland specialist and generalist – specialist (in either woodland or farmland habitats). Second, we took nine of the articles from the systematic review and used them to analyse the effect of classifying species differently on indices of trends in woodland specialist, farmland specialist and generalist species.

### 2.2. Analysis of classification inconsistency

The papers sourced in the systematic review variously classified birds into two or three of the categories, i.e. woodland specialist, farmland specialist and generalist species. Each category was considered by a different number of articles, with the majority of

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