Countryside 2000 Survey

Title
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Description and Summary of Results
Birds are valuable indicators of some aspects of the quality of the countryside for wildlife, and trends in bird populations form one of the 15 *Quality of Life* headline indicators published annually by the UK Government. Furthermore, it is important to understand how bird populations are affected by spatial differences across the countryside in habitat availability and to changes across time in the quantity and quality of these habitats. Countryside Survey 2000 was an Institute of Terrestrial Ecology survey of land use, vegetation, and freshwater plants and animals in a selection of 1-km squares across Britain, and the bird part was Module 5 of this. Most of the squares had been surveyed (though not for birds) 3 or 4 times since the first Countryside Survey in 1978 building up an impressive dataset of the habitats within them. In 2000, for the first time, birds were surveyed by BTO volunteers.

The main aim of the counts was to estimate the abundance of breeding birds in a large sample of the 1-km squares for which detailed information on land use, vegetation and habitat features were collected during the CS2000 Field Survey. These data were used to provide quantitative descriptions of bird assemblages at three different scales: Great Britain, individual countries of Great Britain and Environmental Zones. The six Environmental Zones are aggregations of ITE Land Classes chosen to reflect major environmental variation in the UK, and were those used as a regional framework for reporting the main results of CS2000. The CS2000 bird counts were also used to generate Avifaunal Zones, each of which contained a distinctive breeding assemblage of birds. Preliminary analyses were undertaken of gradients and patterns in bird populations in 1-km squares in relation to summary data on landscape and habitat composition of individual squares.

A total of 336 squares was surveyed by a combination of volunteer and contract workers, with samples of between 29 and 93 in each of the Environmental Zones. A total of 171 species was recorded and were a good representation of terrestrial bird communities in Great Britain. There was a strong relationship between the number of each species recorded on the CS2000 bird counts and the latest British population estimates for the species. The only group that was markedly under-recorded were certain colonial nesting seabirds. Chaffinch *Fringilla coelebs* and Wren *Troglodytes troglodytes* were the only species to feature in the top 10 for all six Environmental Zones while Meadow Pipit *Anthus pratensis* was the most abundant species in the three Zones covering the uplands and marginal uplands.

Cluster analysis suggested that there were similarities in bird assemblages between Environmental Zones 1 and 2 (English and Welsh lowlands), zones 3 and 4 (the English and Welsh uplands and the Scottish lowlands) and zones 5 and 6 (the Scottish uplands), and there was a marked difference between Zones 1 and 2 and the remaining four, indicating a fundamental divergence in the bird assemblages between the English and Welsh lowlands

and the rest of Britain. However, Zone 6 was also found to differ strongly from the others in that the bird community there was dominated by relatively few species.

Avifaunal Zones were also developed using cluster analysis to aggregate Land Classes into zones where bird assemblages were similar. The analysis suggested that between five and eight Avifaunal Zones are identifiable, which are broadly similar to the Environmental Zones in showing strong north-south and altitudinal differentiation. This concept should be explored further.

Specific analyses were conducted for the 20 farmland and 40 woodland species that contribute to the Government's *Quality of Life* headline indicator. Farmland species that have not decreased since the 1970s tend to be ones associated with improved grassland or areas with substantial quantities of woodland or human settlements. Those farmland species that have declined strongly are often ones associated with arable-dominated landscapes. The woodland species show a more complex pattern with declining species being associated with a diversity of landscapes and woodland types.

Methods of Data Capture

Methods in the field were those used in the BTO/JNCC/RSPB Breeding Bird Survey (BBS) with the exception that it involved a more intensive coverage (4km of transect not 2km) in the square than in BBS. Unlike BBS, the aim was to obtain an estimate of the relative abundance of each species that was as representative as possible of the square as a whole. As far as the terrain and access allowed, observers walked four parallel 1km transect lines north-south or east-west. Ideally, transect lines were 200m apart and the outer ones were positioned 200m from the edge of the square. However, this was impractical in many squares and in such cases observers were asked to choose a route that effectively covered the square, excluding open water. Observers were provided with maps onto which they plotted the routes walked so that the actual coverage achieved within the square was fully documented and, hence, repeatable for future surveys. Birds were recorded in distance bands either side of the transect (0-25 m, 25-100 m, >100 m), and individual squares were visited on two occasions during the spring (mainly April, May and June) at least four weeks apart, although in some remote upland areas a single visit in May or June was considered adequate.

Densities of most bird species were estimated for Great Britain, individual countries and Environmental Zones using Distance Sampling techniques. An index of the abundance of each species within individual 1-km squares was derived from the frequency with which it was recorded in the 200m transect sections, ie the proportion of sections occupied. A comparison of density estimates and frequency indices for all species showed a close correspondence between these two measures with only colonial species (eg House Martin *Delichon urbicum* and several seabirds) or very widespread but low density species (eg Cuckoo *Cuculus canorus*) emerging as outliers.

Purpose of Data Capture

The main aim of the counts was to estimate the relative abundance of breeding birds in a large sample of the 1-km squares for which detailed information on land use, vegetation and habitat features were collected during the CS2000 Field Survey.

Geographic Coverage
Randomly selected 1-km squares all over Great Britain, all of which had been used for Countryside Surveys previously.

Temporal Coverage
The spring and early summer of 2000. Two visits to each square were requested April to June.

Other Interested parties
The project (Module 5 of CS2000) was funded by Defra, the Natural Environment Research Council and the BTO itself.

Organiser(s)
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Publications
The main report on the bird parts of CS2000 is:
Wilson, A.M. & Fuller, R.J. 2002. Bird populations and environmental change. *BTO Research Report* no. 263. 116pp.
The set of reports comprising all of Countryside 2000 (and not just the bird Module 5) can be found by following links from http://www.cs2000.org.uk/report.htm.
The project was also noticed in *BTO News* numbers 226 and 236.

Available from NBN?
No.

Computer data -- location
BTO Windows Network central area.

Computer data -- outline contents
The numbers of birds found in each section on each visit to each square, together with information of the location, character and habitats of all the squares. The latter is both from the CS2000 survey and previous ones. All in a series of Excel spreadsheets.

Computer data -- description of contents

CS2000birdcounts.xls is the bird data. The columns are:
square number (reference); Gridref (1-km square); visit day; visit month; visit (1 or 2); species (BTO 2 letter code); distance band (1=<25m, 2=25-100m, 3=>100m); total (total number of birds in that distance band in that square on that visit); then 20 columns (though a square did not necessarily have 20 transect sections) representing sections 1-20 with the total number of the species seen in it.

BTO data set V2.xls is the habitat data for each square from all CSs. (These data are owned by CEH).
All the data are related to Square Reference Number and the worksheets are:
Land Class; Grid Reference; Morphology; Position; Coast; Geology; Climate; Broad habitats; BH pattern 1984; BH pattern 1990; BH pattern 1998; 1984 linear features; 1990 linear features; 1998 linear features.

CS2000transectsdata.xls is coverage. The columns are;
square number; 1km reference; first visit date; second visit date; indication of coverage of each 200m section on first and then second visit (1=covered, 0=not).

counts is a data file of bird count data with an inputting format identical to that for BBS -- note that the same fortran programs must be used to read these data into SAS.

569sqrgridref.xls is details about all CS2000 squares - including easting, northing, grid ref, and where they overlap with BBS (as of 2000).

EZ definitions.xls contains information about the CEH Environmental Zones and how they relate to the old landclasses.

Information held in BTO Archives

2 archive boxes and 1 Transfer Case contain all original field sheets and summary totals and analyses.

Notes on Access and Use

The square locations for CS2000 are Strictly Confidential.
Data must under no circumstances be given to any party without the explicit written consent of the Centre for Ecology and Hydrology who administer and run the whole Countryside Survey project of which the bird surveys conducted by the BTO are part.

Other information needed

Notes on Survey Design

The sampling methods used for CS2000 are a stratified random sample, which ensures representativeness of the range of environments across Great Britain. The sample is stratified by the Institute of Terrestrial Ecology (ITE) Land Classes, ensuring a good geographical spread of survey squares across the country and a reasonable sample size in each Land Class.   The sample is based on the original division of 32 Land Classes, which were subsequently re-assigned to 40 Land Classes in 1998, allowing a distinction of those in England and Wales from those in Scotland.
ITE Land Classes are the foundation of the CS2000 sampling design and are used widely as a means of stratifying samples for extensive surveys. Environmental Zones (EZ) are the basic regional division used for presentation of the CS2000 results. There are three Zones in

England and Wales, three in Scotland and a seventh for Northern Ireland. They are aggregations of the 1990 Land Classes, and cover the range of environmental conditions found in the UK from the lowlands of the south and east, through to the uplands and mountains of the north and west.

Specific Issues for Analysis

Estimates of the density of each species were calculated for each group of squares (Environmental Zones and countries) using distance sampling methods. This approach allows a correction for species-specific and habitat-specific differences in detectability.   The DISTANCE programme fits detection probability functions to model decline in detectability with increasing distance from the transect line. Counts of birds in the first two distance bands are used to make these estimates.

The similarity of bird assemblages in different Environmental Zones was assessed using Ward's minimum linkage cluster analysis applied to the density estimates derived from use of the DISTANCE software. This analysis produces a Dendogram (tree diagram) that indicates how similar bird communities in the zones are, in particular whether any clusters of similar zones are apparent.

Species frequency indices were used to identify which species were characteristic of each Environmental Zone. Such frequency indices are positively correlated with the relative abundance of a species, except for the most widely distributed species whose abundance tends to be underestimated by the use of frequency. Species are regarded as "characteristic" if the difference between the frequency in the one zone is significantly different to that in all other zones.