BTO RESEARCH REPORT 385

Breeding Birds in the Wider Countryside: their conservation status 2004

Baillie, S.R., Marchant, J.H., Crick, H.Q.P., Noble, D.G., Balmer, D.E., Beaven, L.P., Coombes, R.H., Downie, I.S., Freeman, S.N., Joys, A.C., Leech, D.I., Raven, M.J., Robinson, R.A. & Thewlis, R.M.

BTO Birds Science People

Breeding Birds in the Wider Countryside: their conservation status 2004

Trends in numbers and breeding performance for UK birds

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Yellow Wagtail - one of three rapidly declining species with new alerts

Using this website

This website is a "one-stop-shop" for information about the population status of our common terrestrial birds. It is based on data gathered by many thousands of volunteers who contribute to BTO-led surveys. With one page per species, users can quickly find all the key information about trends in population size and breeding performance over the period 1967-2003 as measured by BTO monitoring schemes.

The **summary of key findings** provides a brief overview of our main findings this year. For each species, we provide:

- General information concerning species' conservation listings
- A brief summary of observed changes in the size of the population and information concerning the possible causes of these changes
- A series of graphs and tables showing the trends and changes in population size and breeding performance over the past 35 years
- Trends calculated from BTO/JNCC/RSPB Breeding Bird Survey (BBS) data, not only for the UK as a whole but also for each of its constituent countries (England, Scotland, Wales and Northern Ireland)
- A system of Alerts that highlight population declines in any census scheme of greater than 25% or greater than 50% that have occurred over the past 5 years, 10 years, 25 years and 35 years.

The website also provides details of the field and analytical **methods** that were used to produce the results for each species and of the methods used to identify **alerts**. We **discuss** overall patterns of trends in abundance and breeding success, and compare the latest trend information and alerts with the Population Status of Birds list (**Gregory *et al.* 2002**). Four **appendices** list alerts and population changes by scheme and there is also a facility to display your own **tables of population changes**.

You can navigate your way around the site using links from the **contents page** and between sections. Alternatively use the drop-down menus assessible from the menu bar at the top of each page. The top right menu provides a drop-down list with quick access to the species accounts. To find out about other online survey results and how you can participate visit **BirdWeb** by clicking on the BirdWeb logo in the page footers.

The website covers the majority of British breeding birds, over 100 species in total, but excludes colonial seabirds, which are well covered by the JNCC's Seabird Monitoring Programme (**Mavor *et al.* 2004**), and those species that are already covered by the Rare Breeding Birds Panel (**Ogilvie & RBBP 2003**). Most wintering populations of waterfowl are well covered by the Wetland Bird Survey annual reports (**Pollitt *et al.* 2003**, **Austin *et al*. 2004**).

We value your comments on this report and particularly any suggestions on how it can be improved.

Email your comments

Authors

This report was written by Stephen Baillie, John Marchant, Humphrey Crick, David Noble, Dawn Balmer, Peter Beaven, Rachel Coombes, Iain Downie, Steve Freeman, Andrew Joys, David Leech, Mike Raven, Rob Robinson and Richard Thewlis. The formal citation for the report is given in the page footer.

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Key findings

Declining species

Best trend estimates over the longest available time period (usually 35 years) provide alerts to rapid declines of greater than 50% for 23 species. These are **Grey Partridge**, **Little Grebe**, **Woodcock**, **Turtle Dove**, **Cuckoo**, **Lesser Spotted Woodpecker**, **Skylark**, **Tree Pipit**, **Yellow Wagtail**, **Song Thrush**, **Whitethroat**, **Willow Warbler**, **Spotted Flycatcher**, **Marsh Tit**, **Willow Tit**, **Starling**, **House Sparrow**, **Tree Sparrow**, **Linnet**, **Lesser Redpoll**, **Bullfinch**, **Yellowhammer** and **Corn Bunting**.

Most of these rapidly declining species are already red- or amber-listed on the Population Status of Birds list (**Gregory *et al.* 2002**).

The Turtle Dove is one of a number of farmland birds that show rapid declines over the last 35 years

The **Whitethroat** decline results from the severe crash between 1968 and 1969 linked to conditions on the wintering grounds. The **Little Grebe** decline should be treated with caution as we only have long-term data from waterways. **Lesser Redpoll**, **Tree Pipit** and **Woodcock** also have limited data. For several of the species listed here long-term trend data are only available for England, where BTO has more volunteers to record information. Different long-term trends could be operating in other parts of the UK.

A further 12 species trigger alerts as a result of long-term declines of between 25% and 49% over periods of 25 to 35 years. These are **Red-legged Partridge**, **Kestrel**, **Lapwing**, **Redshank**, **Common Sandpiper**, **Meadow Pipit**, **Grey Wagtail**, **Dunnock**, **Mistle Thrush**, **Lesser Whitethroat**, **Goldcrest** and **Reed Bunting**. Most of these species are already on the PSOB list on account of their population declines.

New alerts

Willow Warbler declined by 58% in England

In the 2004 report, we draw special attention to the alerts for three species that have recently crossed the 50% decline threshold. These are **Yellow Wagtail** (-67%), **Willow Warbler** (–58%) and **Cuckoo** (–56%). These may be candidates for future addition to the red section of the Population Status of Birds (PSOB) list.

We also identify two species that may become candidates to join the amber list due to declines of between 25% and 49%. These are **Common Sandpiper** (-29% over 27 years) and **Lesser**

between 1967 and 2002, and may be a candidate for future red listing.

Whitethroat (-27% over 25 years). **Red-legged Partridge** also falls within this decline category (-48% over 25 years) but would not be a candidate for amber listing because it is introduced.

Positive changes

Relatively few species show evidence of improvements in status. **Song Thrush** numbers have increased by 20% over the last 10 years but even after this recovery they show a 51% decline over the last 35 years.. The 25-year decline measures for **Marsh Tit** and **Reed Bunting** are now below 50% as a result of their declines having levelled out in recent years. However, all of these species will need to show further improvements in status if they are to become candidates to leave the red list. For similar reasons **Dunnock**, **Grey Wagtail** and **Goldcrest** could become candidates for removal from the amber list. Overall, most species that have declined show little sign of recovery in the last ten years (only six of the 37 species with long-term declines).

The Song Thrush is now showing some signs of population recovery following a large decline

Fourteen species have more than doubled over the longest time period for which data are available (usually 35 years). These are **Mute Swan**, **Mallard**, **Coot**, **Oystercatcher**, **Buzzard**, **Stock Dove**, **Collared Dove**, **Woodpigeon**, **Green Woodpecker**, **Great Spotted Woodpecker**, **Nuthatch**, **Blackcap**, **Magpie**, **Carrion Crow**.

Reduced breeding success

Linnets have declined as a result of reduced breeding success

There are a number of species for which declines in breeding performance are likely to be driving the population declines (**Linnet** and **Lapwing**) or helping to inhibit recovery (possibly **Reed Bunting**). The importance of decreases in individual aspects of breeding performance for declining **Yellow Wagtail**, **Dunnock**, **Willow Warbler** and **House Sparrow** remain to be determined, as do the implications of the large reductions in CES productivity measures recorded for **Song Thrush**, **Whitethroat** and **Lesser Redpoll**. Many declining species show improving productivity, probably as a consequence of density-dependent processes (there are more resources available to feed the young when population numbers are low.

Increased breeding success

Increasing breeding performance may be helping to drive population expansion of a number of rapidly increasing species: the predatory **Grey Heron**, **Sparrowhawk** and **Buzzard**; the corvids **Jackdaw**, **Magpie**, **Carrion Crow** and **Rook**; the seed-eaters **Collared Dove** and **Stock Dove**; and the insectivores **Pied Wagtail**, **Robin**, **Wren**, **Nuthatch** and **Great Tit**.

Early nesting

Data from the Nest Record Scheme provide strong evidence of shifts towards earlier laying in a range of species, linked to climate change (**Crick *et al.* 1997**, **Crick & Sparks 1999**). We

have now identified 31 species that, on average, are laying up to 26 days earlier than they did 34 years ago. This latest report adds four species to our previous list of earlier layers; **Great Tit**, **Reed Warbler**, **Wren** and **Blackbird**.

Blackbird is one of four additional species for which trends towards earlier laying have been detected

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1. INTRODUCTION

Since its formation in 1933, BTO has been deeply committed to gathering quantitative information on the bird populations of the UK. Its nationwide network of skilled volunteers, many of whom are long-term contributors to survey schemes, provides the ideal way to monitor the bird populations that are widely distributed across the countryside. BTO data, from such schemes as the **Common Birds Census**, the **BTO/JNCC/RSPB Breeding Bird Survey** and **Nest Record Scheme**, have been increasingly influential in determining nature conservation policy in the UK. The partnership between JNCC and BTO has ensured that these schemes are operated and developed so as to provide high quality information for nature conservation.

The value of the monitoring work undertaken by the BTO is recognised in the Government's Biodiversity Steering Group report (**Anon. 1995**). The BTO's results, particularly those regarding declining farmland species, are highlighted as an example of the way in which broad-scale surveillance techniques can identify important new trends. More generally, the report states that monitoring is essential if the broad aims, specific objectives and precise targets of the Government's Biodiversity Action Plans are to be achieved. It notes that:

- baselines must be established;
- regular and systematic recording must be made, to detect change; and
- the reasons for change should be studied, to inform action.

The BTO's monitoring schemes fulfil a considerable portion of these needs for a wide range of bird species in the UK.

1.1 The BTO's monitoring of breeding birds in the UK

The Integrated Population Monitoring Programme has been developed by the BTO, in partnership with JNCC, to monitor the numbers, breeding performance and survival rates of a wide range of bird species. It has the following specific aims (**Baillie 1990**, **1991**):

(a) to establish thresholds that will be used to notify conservation bodies of requirements for further research or conservation action;

(b) to identify the stage of the life cycle at which demographic changes are taking place;

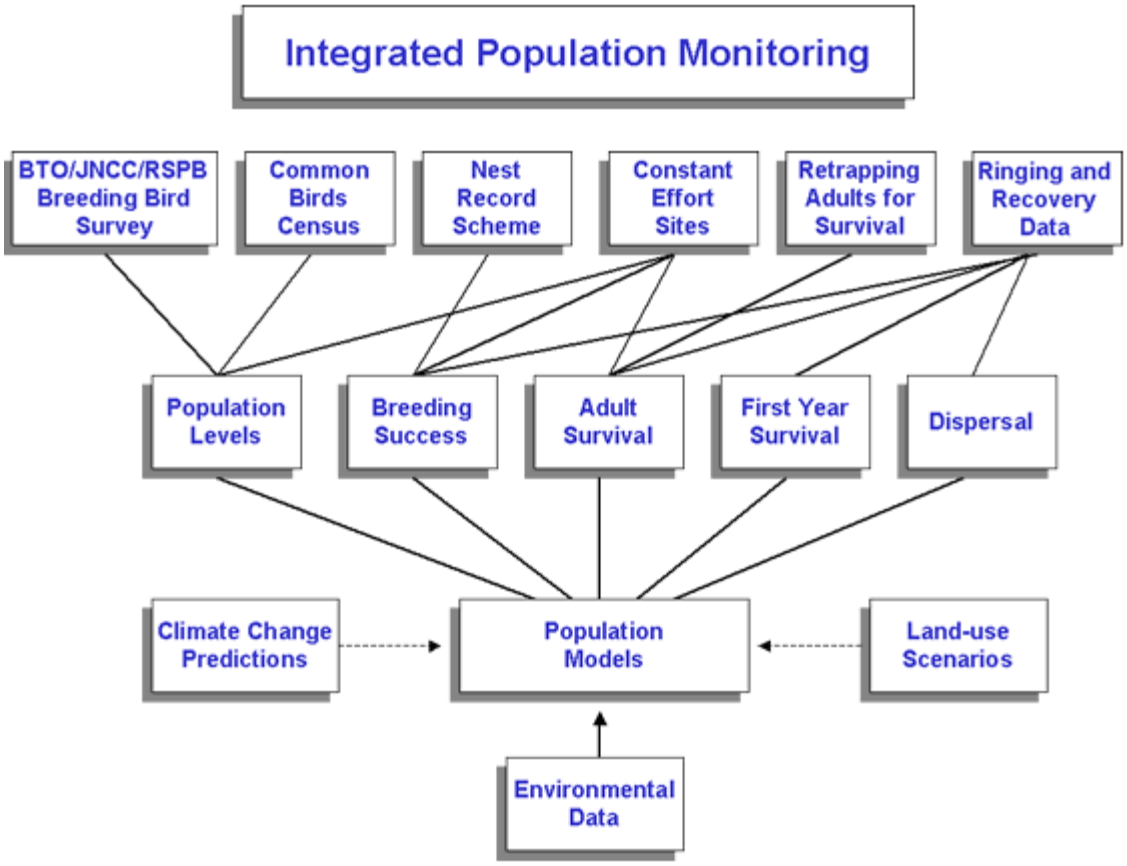
(c) to provide data that will assist in identifying the causes of such changes; and

(d) to distinguish changes in population sizes or demographic rates induced by human activities from those that are due to natural fluctuations in abundance.

The programme brings together data from several long-running BTO schemes.

- Changes in numbers of breeding birds are measured by:
  - the **Common Birds Census (CBC)** - which ran from 1962 and ended in 2000. This scheme mapped the territories of common birds on 200-300 mainly farmland and woodland plots each year, averaging about 70 and 20 ha respectively.
  - the **Waterways Bird Survey (WBS)** - which began in 1974 and maps the territories of birds along rivers, streams and canals on 80-130 plots each year, each covering, on average, 4.5 km.
  - the **Constant Effort Sites Scheme (CES)** - which began in 1983 and is based on bird ringing at over 100 sites. The catching effort is kept constant at each site during each year, so that changes in numbers of birds caught will reflect population changes and not variation in catching effort.
  - the **BTO/JNCC/RSPB Breeding Bird Survey (BBS)** - which began in 1994, has replaced the CBC as the major monitoring scheme for landbirds, after a seven-year overlap. BBS is based on around 2300 1-km squares, within each of which birdwatchers count and record birds in a standardised manner along a 2-km transect. Because the survey squares are chosen randomly, the results are not biased towards particular habitats or regions. Combined CBC/BBS indices now provide long-running and ongoing population monitoring for many common birds.
- Changes in breeding performance are measured by:
  - the **Nest Record Scheme** - which began in 1939 and collates standardised information on up to 35,000 individual nesting attempts per year. This allows the measurement of
    - Laying dates
    - Clutch sizes
    - Brood sizes
    - Nesting success during egg and chick stages
  - the **CES** - which provides information on overall productivity for a range of species by measuring the ratio of juveniles to adults caught each year.
- Changes in survival are measured by:
  - the **British and Irish Ringing Scheme** - which provides information on the finding circumstances and longevity of ringed birds found dead by members of the public.
  - The **CES** can also provide information on survival rates, based on the recapture of ringed birds at CES sites. In future further information on survival rates will be provided by the **Retrapping Adults for Survival** (RAS) project

The ways in which the schemes fit together are shown in the diagram below, which also demonstrates the way in which the BTO aims to combine all this information to understand the mechanisms behind changes in population sizes using population models.



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1.2 The value of combining results from different monitoring schemes

Monitoring the changes in the size of a population does not in itself provide sufficient information on which to base an effective conservation strategy (**Goss-Custard 1993**). Concurrent monitoring of breeding performance and survival rates is necessary to allow changes in population size to be properly interpreted (**Temple & Wiens 1989**) and, for long-lived species, can provide early warning of impending conservation problems (**Pienkowski 1991**).

Where good long-term data sets for breeding performance and survival are lacking, conservation action may have to be taken without an adequate understanding of the mechanisms involved or need to wait for detailed research to be undertaken. For many species, however, BTO already has the necessary data, collected by its volunteers over periods of several decades.

For a long-lived species, a decline in population size may only begin after a long period of low survival or reduced reproductive output. The classic example is that of the Peregrine, which in the UK suffered from poor breeding performance during the 1940s and 1950s due to sub-lethal DDT contamination. This decreased the capacity of the non-breeding population to buffer the severe mortality of breeding adults that occurred due to cyclodiene poisoning from the mid 1950s onwards (**Ratcliffe 1993**). Monitoring of breeding performance gave an early warning of subsequent numerical decline (**Pienkowski 1991**). Another example of a decline in breeding performance that presaged population decline is the catastrophic breeding failures of seabirds, particularly Arctic Terns, in Shetland (**Monaghan *et al.* 1989**, **Walsh *et al*. 1995**).

Farmland birds

During the mid 1980s, the BTO identified rapid declines in the population sizes of several farmland bird species (**O'Connor & Shrubb 1986**, **Fuller *et al.* 1995**). The BTO has since been able to investigate demographic mechanisms of these declines, using its long-term historical databases (**Siriwardena *et al.* 1998a**, **2000a**).

This investigation, which was Government-funded and undertaken jointly with Oxford University, looked at changes in population size, breeding performance and survival rates of a variety of species in relation to changing farming practice. It showed that species responded to different aspects of the agricultural environment, but that typically these aspects were linked to intensification or regional specialisation. Declines in survival rates were found to be the main factor driving population decline in these species, with the exception of **Linnet**, for which the main factor appears to have been a decline in nesting success at the egg stage. The study was therefore able to eliminate some possible causes of change, and identify areas for future research, thus helping conservation bodies to use their scarce resources productively. This work made an important contribution to the wide programme of work on farmland birds undetaken by many research and conservation organisations (**Aebischer *et al.* 2000**, **Vickery *et al.* 2004**).

This report describes a number of other cases where the combined analysis of BTO data sets has helped to identify the causes of population declines, for example on the pages for **Lapwing** (**Peach *et al.* 1994**), **Song Thrush** (**Baillie 1990**, **Thomson *et al.* 1997**, **Robinson *et al.* 2004**), **Sedge Warbler** (**Peach *et al.* 1991**), **Spotted Flycatcher** (**Freeman & Crick 2003**), **Starling** (**Freeman *et al.* 2002**), and **House Sparrow** (**Freeman & Crick 2002**). A fully integrated approach, estimating trends in numbers and demographic parameters through a single model containing data from various BTO surveys, is introduced by **Besbeas *et al.* (2002)**.

Biodiversity Action Plans The ability to quickly determine the stage of the life-cycle which is most affected during population declines is particularly important for the conservation agencies when considering the plight of species on the lists of conservation concern (**JNCC 1996**; **Anon. 1995**, **1998**). Analysis of BTO data sets, which has already helped to build these lists, is a key point in several of the UK Government's Biodiversity Action Plans for rapidly declining species. Once conservation actions have been initiated, the BTO's Integrated Population Monitoring programme has a further function, because the success of these actions will be measured and assessed by continued BTO monitoring.

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1.3 The aims of this report

This report is the latest in a series of reports that are used by conservation practitioners as a ready reference guide to recent changes in status of breeding birds in the UK. By publishing it on the BTO website, we aim to make it available to a much wider audience, especially BTO members and the general birdwatching public. We also hope that it provides a useful resource for schools, colleges and universities, the media, ecological consultants, decision-makers, local government, and the more general world of industry and commerce. In summary, its aims are:

1) To provide to as wide as possible a readership a species-by-species overview of the trends in breeding population size and reproductive success of birds covered by BTO monitoring schemes since the 1960s, at the UK or UK-country scale.

2) To provide warning alerts to JNCC and Country Agencies and other conservation bodies concerning worrying declines in population size or reproductive success, with special reference to species on the UK red and amber lists.

This document is the result of the sustained fieldwork of many thousands of the BTO's volunteer supporters. Without their enthusiasm for collecting these hard-won facts, the cause of conservation in the UK would be very much the poorer.The data we present here are supplemented by information on breeding distributions in the 1988-91 Breeding Atlas (**Gibbons *et al.* 1993**), and on estimates of absolute size of breeding populations, which are reported on regularly by the Avian Population Estimates Panel (**Stone *et al.* 1997**). Colonial seabirds, which are well covered by the recently published results of Seabird 2000 (**Mitchell *et al.* 2004**) and by the JNCC's Seabird Monitoring Programme (**Mavor *et al.* 2004**), and the majority of species covered by the Rare Breeding Birds Panel (**Ogilvie 2003**), are not included here. Wintering populations of waterfowl are covered by the Wetland Bird Survey annual reports (e.g. **Pollitt *et al.* 2003**) and by the WeBS alerts system (**Austin *et al.* 2004**).

The main emphasis of this report is on trends in the abundance and demography of individual species. The data on trends in abundance also provide the basis for multi-species indicators of bird population changes (**Gregory *et al.* 2004**). The Wild Bird Indicator has been adopted as one of the UK Government's 15 headline Quality of Life indicators. Furthermore, the related **Farmland Bird Indicator** is now being used as the basis of the Government's target for farmland bird recovery. This approach is now being extended more widely through a collaboration between EBCC, BirdLife and RSPB to produce **pan European bird indicators**.

The report is the sixth in a series produced under the BTO's partnership with the Joint Nature Conservation Committee (on the behalf of Natural England, Scottish Natural Heritage, the Countryside Council for Wales, and the Environment and Heritage Service in Northern Ireland), as part of its programme of research into nature conservation. The first report (**Crick *et al.* 1997**) investigated population trends exhibited by breeding species during 1971-95. The third report (**Baillie *et al.* 2001**), which was the first to be produced solely as a web document, documented trends during 1968-99. The current report directly supersedes **Crick *et al.* (2004)**, which included data up to 2002. A complete list of all the previous reports and links to all those published online can be found **here**.

Section 2 - Methodology

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2. METHODOLOGY

Six monitoring schemes have contributed data to this report. Five provide data on changes in abundance: Breeding Bird Survey; Common Birds Census; Waterways Bird Survey; Heronries Census; and Constant Effort Sites ringing scheme. Two schemes provide data on changes in productivity: the Nest Record Scheme and the Constant Effort Sites Scheme. In addition, information from detailed analyses of the recoveries of birds from the Ringing Scheme is included where relevant. The methodologies of the monitoring schemes are described below, including information on fieldwork, data preparation, sampling considerations and the statistical methods used in analysis.

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2.1 Breeding Bird Survey

The BTO/JNCC/RSPB Breeding Bird Survey (BBS) was launched in 1994, following two years of extensive pilot work and earlier desk-based studies. The introduction of the BBS was a move designed to overcome the limitations of the **Common Birds Census** (CBC), which had monitored bird populations since 1962. In particular, it improves the geographical representativeness of UK bird monitoring, and thereby promotes both species and habitat coverage. The BBS uses line transects rather than the more intensive territory-mapping method used by the CBC. This makes the survey relatively quick to undertake, and has been successful in encouraging a large number of volunteers to take part. The average time observers spend per visit is only around 90 minutes.

The sampling units are 1x1-km squares of the National Grid. They are selected randomly by computer (see **Data Analysis** below). The BBS requires a relatively large sample of survey squares and the aim is to achieve coverage of about 2500 squares in the UK. An important aspect of BBS is its coordination through a network of volunteer BBS Regional Organisers. Information and survey forms are distributed first to these organisers, who contact volunteers willing to survey the squares every year. After the field season, forms are returned to BTO headquarters again via the Regional Organisers. On-line submission of BBS data is now also available and is recommended - see the **BBS pages** of the main BTO website for details.

Fieldwork involves three visits to each survey square each year. The first is to record details of habitat and to establish the survey route, the second and third to count birds. A survey route is composed of two roughly parallel lines, each 1 km in length, although for practical reasons routes typically deviate somewhat from the ideal. Each of these lines is divided into five sections, making a total of ten 200-m sections, and birds and habitats are recorded within these ten units. The two bird-count visits are made about four weeks apart (ideally early May and early June), ensuring that late-arriving migrants are recorded. Volunteers record all the birds they see or hear as they walk along their transect routes. Birds are noted in three distance categories (within 25 m, 25-100 m, or more than 100 m on either side of the line) measured at right angles to the transect line, or as in flight. Recording birds within distance bands is important because it provides a measure of bird detectability in different habitats and allows population densities to be estimated more accurately. The total numbers of each species, excluding juveniles, are recorded in each 200-m transect section and distance category, as well as the timing of the survey and weather conditions.

By 1998, more than 2300 BBS squares were being surveyed annually, close to the original target of 2500. Only around a quarter of these plots were covered in 2001, owing to Foot & Mouth Disease access restrictions, but (thanks to our keen observers) the sample recovered immediately to over 2100 in 2002 and had increased further to 2254 squares in2003. Squares are distributed throughout the UK and cover a broad range of habitats, including uplands and urban areas. Around 105 species are present on 40 or more BBS squares annually and can be monitored with good precision at the UK scale (**Joys *et al.* 2003**: BTO Research Report 317), although a few present special difficulties because of their colonial or flocking habit or their wide-ranging behaviour. For most of these, BBS can also assess annual population changes within **England** alone, and for about half the species also within **Scotland** and **Wales** as separate units. Sample sizes in **Northern Ireland** currently allow about 20 species to be indexed annually.

Data Analysis
Survey squares are chosen randomly using a stratified random sampling approach from within 83 sampling regions. These sampling regions, which in most cases are the standard BTO regions, are the "strata" (literally layers) of the sample. Survey squares are chosen at random within each region (stratum), to a density that varies with the number of BTO members resident there. Regions with larger numbers of potential volunteers are thereby allocated a larger number of squares, enabling more birdwatchers to become involved in these areas. This does not introduce bias into the results because the analysis takes the differences in regional sampling density into account.

Change measures between years are assessed using a log-linear model with Poisson error terms. For

each species, the higher count from the total early or late counts for each square is used in the model (or the single count if the square was visited only once). Counts are modelled as a function of square and year effects. Each observation is weighted by the number of 1-km squares in each region divided by the number of squares counted in that region, to correct for the differences in sampling density within the UK. The upper and lower confidence limits of the changes indicate the certainty that can be attached to each change measure. When the limits are both positive or both negative, we can be 95% confident that a real change has taken place. Note that this presentation and its interpretation differs from the 85% confidence limits shown on most graphs within this report (see **here** for details).

Trends are presented as graphs in which annual population indices are shown in blue and their 95% confidence limits in green. A caveat of "small sample" is provided where the mean sample size is in the range 30-39 plots per year for England, Northern Ireland, Wales and Scotland trends. A minimum sample size of 40 plots was required for the UK.

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CLICK HERE to go to the BBS section of the main BTO website

2.2 Common Birds Census

The Common Birds Census (CBC), which began in 1962, was the first of the BTO's monitoring schemes for widespread breeding birds, but has now been superseded for this purpose by **BBS**. The 2000 field season was the CBC's last year of full operation. CBC results have been hugely influential in determining conservation priorities in the UK countryside. The store of detailed maps of almost a million birds' territories, collected through the CBC and maintained by BTO since the early 1960s, is a mine of information of unique value for investigating the relationships between breeding birds and their environment, over wide temporal and spatial scales. For many species, CBC and BBS trends can be linked to form joint CBC/BBS trends that provide ongoing monitoring, continuous since the 1960s.

The weaknesses of the CBC as a monitor of UK bird populations were largely related to the time-consuming nature of both fieldwork and analysis. This inevitably limited the number of volunteers able to participate in the scheme, with the result that areas with few birdwatchers were under-represented. Constrained by the relatively small sample size, CBC concentrated on farmland and woodland habitats. Bird population trends in built-up areas and the uplands were therefore poorly represented. Moreover, as the plots were chosen by the observers, some may not have been representative of the surrounding countryside and there may be some bias towards bird-rich habitats. It is for these reasons that the BBS was introduced in 1994. Both surveys were run in parallel for seven years to allow calibration between the schemes (**Freeman *et al.* 2003**: BTO Research Report 303; **Section 2.3** of this report).

CBC, 1962-2000
The results from the Common Birds Census (CBC) provided reliable population trends for more than 60 of the commoner UK breeding species.

The CBC was instigated to provide sound information on farmland bird populations in the face of rapid changes in agricultural practice. Fieldwork was carried out by a team of 250-300 dedicated volunteers. The same observers surveyed the same plots using the same methods year after year. On average, plots were censused for around seven consecutive years but a few observers surveyed the same sites for more than 30 years. Although the original emphasis was on farmland plots, woodland plots were added by 1964. Farmland plots averaged around 70 hectares in extent. Woodland plots were generally smaller, averaging just over 20 hectares. A small number of plots of other habitats, including heathlands and small wetlands, were also surveyed annually, especially before 1985.

A territory-mapping approach was used to estimate the number and positions of territories of each species present on each survey plot during the breeding season. Volunteers visited their survey plots typically eight to ten times between late March and early July and all contacts with birds, either by sight or sound, were plotted on 1:2500 maps. Codes were used to note each bird's species, with sex and age where possible, and also to record activity such as song or nest-building. The registrations were then transferred to species maps and returned to BTO headquarters for analysis. Observers also provided maps and other details of the habitat on their plots. This makes it possible to match the distribution of bird territories with habitat features, providing the potential for detailed studies of bird-habitat relationships.

The pattern of registrations on the species maps reveals the numbers of territories for each species. All assessments of territory number were made by trained BTO staff, applying rigorous guidelines, to ensure consistency between estimates across sites and years.

In 1990, the results from the Common Birds Census were brought together in the book *Population Trends in British Breeding Birds* (**Marchant *et al.* 1990**). This landmark publication discussed long-term population trends for the years 1962 to 1988 for 164 species, with CBC or WBS population graphs for around two-thirds of these.

Validation studies
The CBC was the first national breeding bird monitoring scheme of its kind anywhere in the world and its value has been widely recognised internationally. The territory-mapping method adopted by the CBC is acknowledged as the most efficient way of estimating breeding bird numbers in small areas. **Snow (1965)** compared CBC mapping and intensive nest-finding, and concluded that mapping censuses are good indicators of breeding population size for 70% of species. Experiments to test differences between observers' abilities to detect birds found that, although there was considerable

variation between individual abilities, the observers were consistent from year to year (**O'Connor & Marchant 1981**). As the CBC relies on data from plots covered by the same observer in consecutive years, this source of bias has no implications for the CBC's ability to identify population trends. It has also been confirmed that the sample of plots from which CBC results are drawn has not changed in composition or character over the years (**Marchant *et al.* 1990**) and that the results of territory analysis are not affected by changes in analysts, once trained (**O'Connor & Marchant 1981**). **Fuller *et al.* (1985)** found that farmland CBC plots were representative of ITE lowland land-classes throughout England (excluding the extreme north and southwest), and closely reflected the agricultural statistics for southern and eastern Britain.

Data analysis

Population changes are modelled using a generalised additive model (GAM), a type of log-linear regression model that incorporates a smoothing function (**Fewster *et al.* 2000**). This replaces the Mountford model that employed a 6-year moving window (**Mountford 1982**, **1985**; **Peach & Baillie 1994**) and was used to produce annual population indices until 1999, but the principles are similar. These models are also very similar to log-linear poisson regression as implemented by program TRIM (**Pannekoek & van Strien 1996**). Counts are modelled as the product of site and year effects on the assumption that between-year changes are homogeneous across plots. "Smoothing" is used to remove short-term fluctuations (e.g. those caused by periods of severe weather or measurement error) and thus reveal the underlying pattern of population change. This is achieved by setting the degrees of freedom to 0.3 times the number of years in the series. Confidence limits on the indices are estimated by bootstrapping (a resampling method; **Manly 1991**) and thus do not make any assumptions about the underlying distribution of counts.

Indices are plotted as the blue line on the graphs, and provide a relative measure of population size on an arithmetic scale relative to an arbitrary value of 100 in 2002. If an index value increases from 100 to 200, the population has doubled; if it declines from 100 to 50, it has halved. The two green lines on the graphs, above and below the index line, are the upper and lower 85% confidence limits. A narrow confidence interval indicates that the index series is estimated precisely, a wider interval indicates that it is less precise. The use of 85% confidence limits allows relatively straightforward comparison of points along the modelled line: non-overlap of the 85% confidence limits is equivalent to a significant difference at approximately the 5% level (**Anganuzzi 1993**).

Caveats are provided to show where the data suffer from a "Small sample" if the mean number of plots was less than 20. Data are regarded as "Unrepresentative?" if the average abundance of a species in 10-km squares containing CBC plots was less than that in other 10-km squares of the species' distribution in the UK (as measured from *1988-91 Breeding Atlas* data (**Gibbons *et al.* 1993**)), or, where average abundances could not be calculated, expert opinion judged that CBC data may not be representative.

In practice most CBC data included in this report have been combined with BBS data to provide joint CBC/BBS trends, using the methods described in the next section. These methods for producing joint trends represent an extension of those described above.

Next Page - 2.3 Joint CBC/BBS trends

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CLICK HERE to go to the CBC section of the main BTO website

2.3 Combined Common Birds Census (CBC) and Breeding Bird Survey (BBS) trends

The field protocols for the two surveys are described in sections 2.1 and 2.2. As previously noted, the CBC has been an enormously influential project, providing the main source of information on national population levels in the UK since its inception. For all its importance and impact, however, certain biases in coverage have long been known. Coverage is predominantly in lowland south-eastern Britain, where the numbers of potential volunteers are greatest. Coverage in more sparsely populated upland regions has always been much more patchy. Even within the well-covered regions, sites are situated in a limited number of habitats, predominantly farmland and woodland. Within this region, the results are nevertheless believed to be broadly accurate (**Fuller *et al.* 1985**). However, several species such as Wood Warbler and Meadow Pipit have the greater part of their numbers in the north or west of the country, outside the area adequately covered. For these species, the CBC may not accurately reflect national trends.

The BBS, on account of its more rigorous, stratified random sampling design, and its simplicity in the field, produces data that better cover the previously under-represented areas. In previous editions of 'Breeding Birds in the Wider Countryside' (e.g. **Baillie *et al.* 2002**), indices have been published both from CBC and BBS data, for those species with sufficiently large sample sizes. The CBC was discontinued in 2000; from now on, BBS data will be used in the production of national population trends dating back to its year of establishment, 1994.

For many purposes, however, the presentation and analysis of longer time-series will be required, dating back to before the establishment of the BBS but coming right up to the present day. The calculation of 25-year alert designations, as in this report, provides just one example. This need has led to the BTO recently carrying out research into the compatibility of indices from BBS and CBC data in various years and regions, and the possibility of deriving trustworthy long-term indices from the two data sources in combination (**Freeman *et al.* 2003**). This research suggested that for the vast majority of species considered there was no significant difference between population trends, calculated from the two surveys, based on that part of the country where CBC data are sufficient to support a meaningful comparison. Where a statistically significant difference was found, this was sometimes for very abundant species for which the power to detect even a biologically insubstantial difference was considerable. Within this region, therefore, long-term trends based on CBC and BBS data can be produced for almost all species previously monitored by the CBC alone. In **Freeman *et al.* (2003)** this was the area covered by **Fuller *et al.* (1985)**, because CBC plots in that region were shown to be representative of lowland farmland there. As this region covers the bulk of England, and for consistency with the rest of this report we have produced joint indices for CBC/BBS for the whole of England (called CBC/BBS-England index), rather than just the Fuller rectangle. A similar UK index can be produced for only about 50% of species (CBC/BBS-UK index).

A second question then is whether one can obtain reliable trends over the same period for the entire UK. That is, since prior to 1994 only CBC data are available, are the population trends within the region well-covered by the CBC typical of those for the UK as a whole? The shortage of CBC data in the north and west means that the only way of investigating this is via the BBS data. Significant regional variation in trends was found for approximately half the species (see **Freeman *et al.* 2003** for full details). For such species, the regional bias in CBC data means that no reliable UK index can be produced prior to 1994. In summary, joint population indices dating back to the start of the CBC can continue to be produced for that part of the country well served by the CBC for almost all common species.

The present 'Breeding Birds in the Wider Countryside' is the first since the close of the CBC and the first to present joint CBC/BBS indices, in place of those derived solely from the CBC. The model fitted to these combined data is that historically employed for the BBS, a Generalized Linear Model with counts assumed to follow a Poisson distribution and a logarithmic link function. Standard errors were calculated via a bootstrapping procedure. For presentation in the figures, both the population trend and its confidence limits were also subsequently smoothed using a thin-plate smoothing spline with 11 degrees of freedom.

Indices are plotted as the blue line on the graphs, and provide a relative measure of population size on an arithmetic scale with a 2000 value of 100. If an index value increases from 100 to 200, the

population has doubled; if it declines from 100 to 50, it has halved. The two green lines on the graphs, above and below the index line, are the upper and lower 85% confidence limits. A narrow confidence interval indicates that the index series is estimated precisely, a wider interval indicates that it is less precise. The use of 85% confidence limits allows relatively straightforward comparison of points along the modelled line: non-overlap of the 85% confidence limits is equivalent to a significant difference at approximately the 5% level (**Anganuzzi 1993**).

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2.4 Waterways Bird Survey

The Waterways Bird Survey (WBS) has monitored the population trends of up to 24 riparian bird species on canals and rivers throughout the UK since 1974. WBS uses a territory-mapping method like that of its parent scheme, the **Common Birds Census**, to estimate the breeding population of waterbirds on each plot. Detailed territory maps are prepared that can be compared with habitat data to show which features of linear waterways are important to breeding birds. The plots average 4.4 km in length; almost half are slow-flowing lowland rivers with the rest either fast-flowing rivers/streams or canals. There are currently around 90 plots distributed throughout the UK. The proportion of plots in the north and west of England is higher than existed in the CBC (**Marchant *et al.* 1990**). Wales, Scotland and especially Northern Ireland are relatively poorly covered.

All fieldwork is carried out by volunteers. Observers are asked to survey their plot on nine occasions between March and July, mapping all the birds seen or heard onto 1:10,000-scale maps. Registrations are then transferred to species maps, which are analysed to reveal the numbers and positions of territories for each species. Since 1994, observers have completed their own territory analysis, based on the scheme's written guidelines, with results checked by BTO staff. This has successfully speeded up the processing of WBS data at BTO headquarters. As WBS employs very similar methods to those of CBC, the validation studies carried out for the latter generally hold true for WBS (see **section 2.2**). **Marchant *et al.* (1990)** found that there has been little change in the composition of the WBS sample in terms of waterway type or geographical spread. Trend analysis and presentation follows the same pattern as CBC (**section 2.2**), except that the "unrepresentative?" caveat has not been used. A caveat of "small samples" is provided when the number of plots is between 10 and 19.

Population changes along waterways are reported annually in *BTO News* for around 20 riparian species, of which Goosander is not covered by BBS monitoring. For specialist waterbirds, including Little Grebe, Mute Swan, Common Sandpiper, Kingfisher, Sand Martin, Grey Wagtail, Dipper and Reed Warbler, targeted surveys along waterways can provide a better precision of monitoring than is possible through the more generalised BBS surveys. WBS indices can also add a new perspective on trends in waterbirds that are monitored, largely in other habitat types, by CBC/BBS. For **Lapwing**, populations declined rapidly on arable farmland during the late 1980s while numbers on WBS plots, typically representing populations along river floodplains, showed greater stability. **Yellow Wagtails** have declined much more steeply in WBS habitats than elsewhere.

WBS has similar limitations as a monitoring scheme that led to the CBC's replacement by BBS. In particular, plot distribution is biased geographically and possibly also towards sites that are good for birds, and an intensive survey method is used that severely limits the sample size (**Marchant *et al.* 1990**). A drawback specific to WBS is that it covers only waterbirds. BTO has addressed these issues by setting up the **Waterways Breeding Bird Survey (WBBS)**, which has been running since 1998 in parallel with WBS. WBBS uses BBS-style transect methods along random waterways, and includes all species of birds. If, once its development is completed, WBBS becomes an ongoing scheme, it will provide useful monitoring data to supplement BBS.

Data analysis
Smoothed population trends are estimated using Generalized Additive Models, with confidence intervals calculated by bootstrapping (**Fewster *et al.* 2000**). The analytical procedure is the same as that used for the CBC (**section 2.2**).

Next section - 2.5 Heronries Census

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CLICK HERE to go to the WBS section of the main BTO website

2.5 Heronries Census

The BTO Heronries Census began in 1928 and is the longest-running breeding-season bird monitoring scheme in the world. As predators at the top of the freshwater food chain, Grey Herons are excellent indicators of environmental health in the countryside. They build large stick nests, mostly in colonies at traditional sites. The aim of this census is to collect annual nest counts of Grey Herons from as many sites as possible in the United Kingdom. Volunteer observers make counts of 'apparently occupied nests' at heron colonies each year. Changes in the numbers of nests, especially over periods of several years, provide a clear measure of the population trend. In recent seasons, observers have also counted the nests of Little Egrets *Egretta garzetta*, which have been appearing in an increasing number of southern heronries since the first records in 1996.

Coverage is coordinated through a network of regional organisers. A core of birdwatchers and ringers monitor their local colonies annually, providing a backbone of regular counts. Around two-thirds of the heronries in England and Wales are currently counted each year, with more-complete censuses carried out in 1929, 1954, 1964, 1985 and 2003. Except during the special surveys, rather few counts are made of heronries in Scotland and Northern Ireland. Counts are submitted mostly on cards and the data are entered onto computer at BTO headquarters. The number of heronries cards submitted each year is around 450.

Data analysis
Population changes are estimated using a ratio-estimators approach derived from that of **Thomas (1993)**. Essentially, the ratios of the populations in any two (not necessarily consecutive) years of the survey are estimated from counts at sites visited in each of those years. These ratios can be used to estimate the counts at sites that were not visited, and hence build an estimate of the total population. Further modifications have been made to allow for the extinction of colonies and the establishment of new ones, resulting in the graph as shown (**Marchant *et al.* 2004**). A short report containing simple estimates of change for the latest year is published annually in *BTO News*.

On the **Grey Heron** page of this report, the trend is presented graphically with annual estimates in blue and their 85% confidence limits in green. A smooth trend line in red is based on a non-parametric regression model, using thin-plate smoothing splines with 23 degrees of freedom.

Next Section - 2.6 Constant Effort Sites Scheme

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CLICK HERE to visit the Heronries Census page of the main BTO website

CLICK HERE to visit the Little Egrets page of the main BTO website (WeBS)

2.6 Constant Effort Sites

The Constant Effort Sites (CES) Scheme uses changes in catch sizes across a network of more than 100 standardised mist-netting sites to monitor changes in the abundance and breeding success of common passerines in scrub and wetland habitats. At each constant effort site, licensed ringers erect a series of mist-nets in the same positions, for the same amount of time, during 12 morning visits between May and August. Year-to-year changes in the number of adults caught provide a measure of changing population size, while the proportion of young birds in the total catch is used to monitor annual productivity (breeding success). By monitoring the abundance of young birds between May and August, the CES method should integrate contributions to annual productivity from the entire nesting season, including second and third broods for multi-brooded species. Between-year recaptures of ringed birds can also be used to calculate annual survival rates, although this requires specialised analytical techniques (e.g. **Peach 1993**) and is not considered further here. Further details of the CES Scheme and methods of analysis are presented by **Peach *et al.* (1996)**.

The CES Scheme began in 1983 with 46 sites and now has nearly 150. The distribution of CES sites tends to reflect the distribution of ringers within Britain and Ireland. The majority are operated in England, and there are small numbers in Scotland, Wales, Northern Ireland and the Republic of Ireland. The CES monitors the populations of 28 species of passerines in scrub and wetland habitats.

Data Analysis
Annual estimates of the abundance of adults and young are separately assessed through application of log-linear Poisson regression models, from which fitted year-effects are taken as annual relative abundances, compared to an arbitrary value of 100 in 2002. 85% confidence limits are based on the corresponding asymptotic standard errors. At sites where catching effort in a year falls below the required 12 visits, but a minimum of 8 are completed, annual catch sizes are corrected according to experience during years with complete coverage by incorporating an offset into the generalized linear model (see **Peach *et al.* 1998** for full details). Sites with fewer visits in a given year are omitted for the year in question.

Annual indices of productivity (young per adult) are estimated from logistic regression models applied to the proportions of juvenile birds in the catch, the year-effects then being transformed to measures of productivity relative to an arbitrary value of 100 in 2002. As above, catch sizes are corrected for small numbers of visits missed where necessary. It should be noted that these indices are relative, and are not estimates of the actual numbers of young produced per adult.

Data are presented graphically with annual estimates in blue and their 85% confidence limits in green. Methods and software for the optimal fitting of smoothed trends to CES data remain in development. Here, we also present a non-parametric regression model fitted to the calculated annual indices of abundance and productivity (via thin-plate smoothing splines with 5 degrees of freedom), to provide a simple smoothed picture. This is the red smoothed line on the CES graphs on the species pages. A caveat is provided for "small samples" when the average number of plots per year is between 10 and 19.

Next Section - 2.7 Nest Record Scheme

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2.7 Nest Record Scheme

The BTO's Nest Record Scheme is the largest, longest-running and most highly computerised of such schemes in the world and possesses the most advanced and efficient techniques of data gathering, data capture and analysis (**Crick *et al.* 2003**). There are currently more than a million nest records held by the Trust, of which 35% are computerised.

The primary aim of the Nest Record Scheme is to monitor the breeding performance of a wide range of UK birds annually as a key part of the BTO's data collection. Annual reports are published (e.g. **Crick *et al.* 2004a**) and the significant results communicated immediately to JNCC. Another primary aim is to undertake detailed analyses of breeding performance of species of conservation interest (e.g. **Crick *et al.* 1994**, **Brown *et al.* 1995**, **Peach *et al.* 1995**, **Crick 1997**, **Browne *et al.* in press**).

The Nest Record Scheme gathers data on the breeding performance of birds in the UK through a network of volunteer ornithologists. Each observer is given a code of conduct that emphasises the responsibility of recorders towards the safety of the birds they record and explains their legal responsibilities. These observers complete standard nest record cards for each nest they find, giving details of nest site, habitat, contents of the nest at each visit and evidence for success or failure. When received by the BTO staff, the cards are checked, sorted and filed away ready for analysis. Those for Schedule 1 species are kept confidential. (These are species protected from disturbance at the nest by Schedule 1 of the Wildlife & Countryside Act 1981: they are generally rare species and the location of their nests may need to be protected from egg collecting (an illegal activity) or other potential disturbance. To visit the nests of these species a special licence is required.). Computer programs developed by BTO check the data for errors and calculate first-egg date, clutch size, nest loss rates at egg and chick stages. Data are computerised according to priorities for population monitoring and for specific research projects.

Currently the BTO collects a total of more than 30,000 records each year for around 180 species. Typically, there are more than 150 records for 55 species and more than 100 for a further 10-15 species. The quality of records improved substantially in 1990 with the introduction of a new recording card, which promotes greater standardisation and clarity in the information recorded by observers. The general distribution of Nest Record Cards is patchy at the county scale but is more even over larger regions of the UK. Overall, Northern Ireland and parts of Scotland (southeast, Western Isles) and parts of England (west Midlands, southwest) have relatively low coverage, often reflecting observer density. A major analysis of trends over time in various aspects of breeding performance found relatively few differences between major regions in the UK, when analysed using analysis of covariance (**Crick *et al*. 1993**). Habitat coverage is broad, as the scheme receives records from all the UK's major habitats. Most records come from woodland, farmland and freshwater sites, but the scheme also receives data from scrub, grassland, heathland and coastal areas.

Data Analysis

Five different variables were analysed for this report: laying date (where day 1 = January 1); clutch size; brood size; and daily nest failure rates during egg and nestling stages, calculated from the methods of **Mayfield (1961**, **1975**) and **Johnson (1979)** (see **Crick *et al.* 2003** for review).

In order to minimise the incidence of errors and inaccurately recorded nests, a set of rejection criteria was applied to the data: laying date only included cases where precision was within ±5 days; clutch size was not estimated for nests which had been visited only once, for nests which were visited when laying could still have been in progress, or for nests which were only visited after hatching; and maximum brood size was calculated only for nests which were observed after hatching. The last variable is an underestimate of brood size at hatching because observers may miss early losses of individual chicks; it differs from clutch size because eggs may be lost during incubation and hatching success may be incomplete.

Daily failure rates of whole nests were calculated using a formulation of **Mayfield's (1961**, **1975**) method as a logit-linear model with a binomial error term, in which success or failure over a given number of days (as a binary variable) was modelled, with the number of days over which the nest was exposed during the egg and nestling periods as the binomial denominator (**Crawley 1993**, **Etheridge *et al.* 1997**, **Aebischer 1999**). Number of exposure days during the egg and nestling periods was

calculated as the midpoint between the maximum and minimum possible, given the timing of nest visits recorded on each Nest Record Card (note that exposure days refer only to the time span for which data were recorded for each nest and do not represent the full length of the egg or nestling periods). Each calculation assumes that failure rates were constant during the period considered. Violations of this assumption of the Mayfield method can lead to biased estimates if sampling of nests is uneven over the course of each period. It is unlikely that any such bias would vary from year to year, so although absolute failure rates may be biased, annual comparisons should be unaffected (**Crick *et al.* 2003**). In this report, therefore, we present only temporal trends in daily nest failure rates.

Statistical analyses of nest record data were undertaken using SAS programs (**SAS 1990**). Regressions through annual mean laying dates, clutch sizes and brood sizes were weighted by sample size. Nest survival was analysed by logistic regression. Quadratic regressions were used when the inclusion of a quadratic term provided a significant improvement over linear regression. These are described as "curvilinear" in the tables on species pages. Significant linear trends are described as "linear". The best fitting regressions (i.e. quadratic or linear) are presented on the figures in this report. Where neither regression is significant the linear regression line is shown for illustrative purposes.

Results are presented only if the mean sample size of records for a particular variable and species exceeds 10 per year, and are presented with a caveat for small sample sizes if the mean number of records contributing data was between 10 and 30 per year.

Next Section - 2.8 The Alert System

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CLICK HERE to go to the NRS section of the main BTO website

2.8 The Alert System

2.8.1 General approach

The alert system used within this report is designed to draw attention to developing population declines that may be of conservation concern. It also identifies situations where long-term declines have reversed, leading to an improvement in conservation status. It must be stressed that the changes reported here are advisory and do not supersede the agreed UK conservation listings (**Gregory *et al*. 2002**; see **PSoB** pages). They are based on similar criteria to *The Population Status of Birds in the UK*, however, and so provide an indication of likely changes at future revisions.

The system is based on statistical analyses of the population trend data for individual species. Alerts seek to identify rapid declines (>50%) and moderate declines (>25% but <50%). These declines are measured over a number of time-scales, depending on the availability of data - the full length of the available time series, and the most recent 25 years, 10 years and 5 years for which change can be estimated. The conservation emphasis is particularly on the longer periods, but short-term changes help to separate declines that are continuing - or accelerating - from those that have ceased or reversed.

The alerts are calculated annually using standard automated procedures. Where species are at the margin of two categories (e.g. a decline of about 25%) they may fire alerts in some years but not others, or different levels of alert in different years.

Data on some species might be biased, owing to unrepresentative monitoring, or imprecise, owing to small sample sizes. Because these data often provide the only information that is available, our general approach is to report all the alerts raised but to clearly flag up any deficiencies in the data.

2.8.2 Smoothing population trends

Bird populations show long-term changes that do not follow simple mathematical trajectories. In addition to the long-term trends, unsmoothed population indices also show short-term fluctuations resulting from a combination of natural population variability and statistical error. We use smoothing techniques that aim to extract the long-term pattern of population change, without forcing it to follow any particular shape (such as a straight line or a polynomial curve). These methods remove most of the effects of short-term fluctuations (including any natural year-to-year variability) so that the long-term trend is revealed more clearly.

Technical details available here

2.8.3 Years used for analysis

Once a smoothed population trend has been calculated, change measures are calculated from the ratio of the smoothed population indices for the two years of interest. Population indices for the first and last years of a smoothed time series are less reliable than the others, and so we always drop them before calculating alerts. Because the latest year is not included, the alerts are therefore less up-to-date than they could be, but fewer false alarms are generated. The latest year's data points do contribute to the smoothed curve and are dropped only after the smoothing has taken place.

The time taken to collate and analyse bird monitoring data is another factor affecting the years that can be included in these analyses. Full analyses of data sets are not usually all available until 12-15 months after the end of a particular breeding season. This report was prepared in 2004 when we had analyses of monitoring data up to 2003. As we drop the final year of the smoothed time series, we

report here on change measures up to 2002.

Long-term changes for most of the species included in this report are calculated from joint Common Birds Census and Breeding Bird Survey data (CBC/BBS indices). The CBC started on farmland in 1962 and on woodland in 1964. However, the early years of the CBC population indices are strongly influenced by the effects of the unusually severe winters of 1961/62 and 1962/63, as well as by developments in methodology (**Marchant *et al.* 1990**). Therefore joint CBC/BBS indices have been calculated using the data from 1966 onwards and population changes are calculated back to 1967.

Data for other schemes generally start as soon as the scheme had reached a sufficient size to produce reliable results. The maximum periods available from the main schemes contributing to this report are set out in the table below.

Scheme	Years available		Maximum alert period		
	First year	Last year	First year	Last year	Number of years
CBC/BBS	1966	2003	1967	2002	35
Waterways Bird Survey	1974	2003	1975	2002	27
Constant Effort Sites	1983	2003	1984	2002	18
Heronries Census	1928	2003	1929	2002	73
Breeding Bird Survey	1994	2003	-	-	-

2.8.4 Confidence limits and statistical testing

We show 90% confidence limits for population change measures wherever possible. Any decline where the confidence limits do not overlap zero (no change) is regarded as statistically significant and will trigger an alert if it is of sufficient magnitude. Note that, because we are seeking to detect only declines, we are using a one-tailed test - with a P value of 0.05. These confidence limits therefore do not indicate whether increases are statistically significant.

The graphs of population trends show 85% confidence limits because these allow an approximate visual test of whether the difference between the indices for any two given years is statistically significant: if the indices for two given years are assumed independent and normally distributed with standard errors of comparable size (standard errors differing by a factor of up to about 2 are quite acceptable), then to a good approximation the difference between the indices is significant at the 5% level if there is no overlap in their 85% confidence intervals (**Buckland *et al.* 1992**). This test is fairly robust, and the independence assumption is reasonable if the years are some distance apart.

Technical details available here

2.8.5 Data-deficient species

There is uncertainty about the reliability of the results for some species, either because data may be unrepresentative or because they are based on a very small sample of plots. In these cases the cause of the uncertainty is recorded in the comment column of the population change table.

Unrepresentative data

In this report we only present joint UK or England CBC/BBS trends if there was no substantial or statistical difference between the trends from the two schemes over the period when they ran in parallel. Thus the trends are always considered representative of the region concerned.

In previous reports representativeness was assessed using the criteria developed by **Gibbons *et al.* (1993)**. Data from the 1988-91 Breeding Atlas were used to compare the average abundance of a given species in 10-km squares with and without CBC plots. If average abundance is higher in squares without CBC plots, it is likely that much of the population is not well sampled by the CBC. In past reports, CBC data for such species were labelled as "unrepresentative". Where there are insufficient data to undertake such calculations, expert opinion was used.

Sample size

Sample size is assessed from the average number of plots contributing to the population indices for a given species in each year. A plot with a zero count would be included provided that the species had been recorded there in at least one year and that records for that plot were available for at least two years. Plots where a species has never been recorded do not enter the index calculations. These average sample sizes are shown in column four (plots) of the population change tables. For CBC, WBS and CES, a mean of between 10 and 19 plots is flagged as a small sample. For BBS indices for individual countries a mean in the range 30-39 plots is flagged as a small sample. UK BBS indices are only presented for samples of at least 40 plots.

2.8.6 Application to individual schemes

Currently the full methodology outlined above is applied to the CBC/BBS and the WBS trends. For the CES scheme and the Heronries census we present annual indices with confidence limits and then fit a smoothed curve through the annual index values. We do not currently have confidence limits for this smoothed curve. Therefore all alert labels for CES are shown in square brackets. There are no alerts for Grey Heron.

BBS started in 1994 so only nine years' data (1994-2003) were available for this report. This is not a long enough time series to apply the smoothing methods and alerts framework outlined above. Therefore we have simply calculated change measures between the first and last years of the BBS time series based on the standard 'sites x years' model that is used to produce the BBS indices each year.

Technical details available here

Next - 2.9 Statistical methods used for alerts

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2.9 Statistical methods used for alerts

The Alert System page contains a general overview of how the alert system works. More detailed information is given below about the statistical methods used to estimate population indices, population changes and their confidence intervals.

2.9.1 General structure of data

The data for all of the schemes reported here consist of annual counts made over a period of years at a series of sites. They can thus be summarised as a data matrix of sites x years, within which a proportion of the cells contain missing values because not all of the sites are covered every year. Such data can be represented as a simple model:

log (count) = site effect + year effect

Each site has a single site-effect parameter. These site parameters are not usually of biological interest but they are important because abundance is likely to differ between sites. The main parameters of interest are the year effects. These can be modelled either with as many parameters as years (an annual model), or with a smaller number of parameters, representing a smoothed curve.

A simple annual model would be fitted as a generalised linear model with Poisson errors and a log link function. This is the main model provided by the widely used program TRIM (Pannekoek & van Strien 1996).

2.9.2 Fitting smoothed models

Our preferred method for generating a smoothed population trend is to fit a smoothed curve to the data directly using a generalised additive model (GAM) (Hastie & Tibshirani 1990, Fewster *et al.* 2000). Thus the model from the previous section becomes:

log (count) = site effect + smooth (year)

where smooth (year) represents some smooth function of year. It was not straightforward to fit GAMs to the CBC/BBS, CES or Heronries Census data and we have therefore fitted smooth curves with a similar degree of smoothing to the annual indices (details given below).

The non-parametric smooth curve fitted in our models is based on a smoothing spline. The degree of smoothing is specified by the number of degrees of freedom (df). A simple linear trend has df = 1 while the full annual model has df = t-1, where t is the number of years in the time series. Here we set df to be approximately 0.3 times the number of years in the time series (Fewster *et al.* 2000). The degrees of freedom used for the main data sets presented on the web site are summarised below.

	Years	Length of time series	df for smoothed index
CBC/BBS	1966-2003	38	11
Waterways Bird Survey	1974-2003	30	9
Constant Effort Sites	1983-2003	21	6
Heronries Census	1928-2003	76	23

Note that the numbers of years shown here are different from those available for calculating change measures, because we use the whole time series available for analysis (i.e. prior to the truncation of end points), and because we count the number of years in the time series rather than the number of

annual change measures.

2.9.3 CBC/BBS trends

The present 'Breeding Birds in the Wider Countryside' is the first since the close of the CBC and the first to present joint CBC/BBS indices, in place of those derived solely from the CBC. The model fitted to these combined data is that historically employed for the BBS, a Generalized Linear Model with counts assumed to follow a Poisson distribution and a logarithmic link function. Standard errors were calculated via a bootstrapping procedure. For presentation in the figures, both the population trend and its confidence limits were also subsequently smoothed using a thin-plate smoothing spline with 11 degrees of freedom.

2.9.4 Waterways Bird Survey

GAMs were fitted to the WBS data using the approach described above (**Fewster *et al.* 2000**). Confidence limits were fitted using a bootstrap technique to avoid restrictive assumptions about the distribution of the data. Bootstrap samples were drawn from the data by sampling plots with replacement. We generated 199 bootstrap samples from each data set and fitted a GAM to each of them. Confidence limits for the smoothed population indices (85% cl) and change measures (90% cl) were determined by taking the appropriate percentiles from the distributions of the bootstrap estimates The section on **confidence limits and statistical testing (2.8.4)** gives the reasons for choosing these particular confidence limits.

The GAMs were fitted using a modified version of the FORTRAN program GAIM (**Hastie & Tibshirani 1990**).

2.9.5 Constant Effort Sites

Annual indices were fitted to catches of adults and juveniles separately using the method described by **Peach *et al.* (1998)**. This is essentially the annual 'sites x years' model described above but with the addition of an offset to correct for missing visits.

Offsets could not easily be incorporated in the GAM software that we have available. Therefore we fitted a smooth curve to the annual indices. This was done using PROC TSPLINE of SAS with 6 degrees of freedom. This procedure should give very similar estimates to a GAM analysis, but it does not provide confidence intervals for the smoothed population trends, nor for the change measures derived from it. Therefore all alert flags relating to the CES are shown in square brackets.

2.9.6 Heronries Census

The Heronries Census data were analysed using a modified sites x years model which incorporates information about new colonies (sites) that have been established and other colonies from the sample that are known to have gone extinct. The method was developed by **Thomas (1993)** specifically in relation to the heronries data set. Since then the heronries database has been substantially upgraded and the method has been applied to the full data set (**Marchant *et al.* 2004**).

The above method of analysis cannot be easily applied within a GAM framework. Therefore we fitted a smooth curve to the annual indices. This was done using PROC TSPLINE of SAS with 23 degrees of freedom. This procedure should give very similar estimates to a GAM analysis but it does not provide confidence intervals for the smoothed population trend or the change measures derived from it. This is not a serious limitations as there are no potential alerts for **Grey Heron**, whose populations have generally been increasing.

Section 3 - Species pages

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SPECIES LIST

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Waders
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List of species (in BOU taxonomic order)

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Little Owl
Tawny Owl
Nightjar
Swift
Kingfisher
Green Woodpecker
Great Spotted Woodpecker
Lesser Spotted Woodpecker
LARKS
Woodlark
Skylark
Swallow
Sand Martin
House Martin
Tree Pipit
Meadow Pipit
Yellow Wagtail
Carrion Crow
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Linnet
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Bullfinch
BUNTINGS
Yellowhammer
Reed Bunting
Corn Bunting

Information to aid interpretation of the pages for individual species can be found on the Species Help Page

3. Help on species accounts

Depending on the availability of data (not every species is covered by each scheme), each account consists of the following:

1) ***Conservation listings:*** First, the European conservation category is given, according to current listings by BirdLife International in ***Birds in Europe*** (**BirdLife International 2004**). These update the original listings of **Tucker & Heath (1994)**. For SPECs (Species of European Conservation Concern), the European Threat Status is also given. The current SPEC categories are as follows:

SPEC 1	Species of global conservation concern, according to the latest assessments by BirdLife International (see **www.birdlife.org/datazone/species/index.html**)
SPEC 2	Species with an unfavourable European conservation status, and with more than half of the global breeding or wintering population concentrated in Europe
SPEC 3	Species with an unfavourable European conservation status, but with less than half of the global breeding or wintering population within Europe

Other species, not considered to be of European conservation concern, and assessed as 'secure', have no SPEC category but are placed into two further groupings:

Non-SPEC^{E}	Species with a favourable European conservation status, but with more than half of the global breeding or wintering population concentrated in Europe
Non-SPEC	Species with a favourable European conservation status, and with less than half of the breeding or wintering population within Europe

The UK conservation listing, given next, is taken from *The Population Status of Birds in the UK* (**Gregory *et al.* 2002**; see **PSoB** pages). These supersede the previous *Birds of Conservation Concern* listings (**Gibbons *et al.* 1996**), and cover the period 2002-07. There are three categories, as follows:

Red	high conservation concern
Amber	medium conservation concern
Green	all other species (except introduced species, which are not classified)

The main reason or reasons for listing as red or amber are also given. NB:

- SPEC 1 (globally threatened) species are red-listed, and SPEC 2 or 3 species are amber-listed (unless they are introduced or a red-list criterion applies)
- Red- or amber-listing may stem from decline, localisation or importance of non-breeding as well as breeding populations in the UK
- Rates of population decline are generally derived from CBC results for the 25-year period 1974-99
- Range declines are generally calculated from the numbers of 10-km squares occupied in the **two breeding atlases** (**Gibbons *et al.* 1993**)
- Historical decline (in UK between 1800-1995) is assessed by literature review

2) ***Long-term trend:*** This summarises the trend in population size since 1975 from WBS data, 1984 from CES data, or 1967 from CBC/BBS, with reference to any CBC/BBS, WBS or CES data that may be tabulated. If there are no data available from these schemes, any assessment of trends covers the period since about the mid 1960s, but may also take historical data into account. Increases and declines that are qualified as 'shallow', 'moderate' or 'rapid' are generally statistically significant. The following terms are used (with percentages rounded to the nearest whole number):

- **Rapid decline:** >50% population decline from CBC/BBS, WBS or CES

- **Moderate decline:** 25-49% population decline from CBC/BBS, WBS or CES
- **Shallow decline:** 10-24% population decline from CBC/BBS, WBS or CES
- **Decline/Increase:** information has been derived from other sources
- **Probable/Possible increase/decline:** as above, but the information is not as certain - see the status summary for reasons
- **Stable/Fluctuating, with no long-term trend:** no overall change, or change <10%
- **Uncertain:** where the information from two monitoring schemes indicate conflicting trends or if the schemes are unrepresentative of the species' total UK population
- **Unknown:** no information on the UK population trend is available
- **Shallow increase:** 10-49% population increase from CBC/BBS, WBS or CES
- **Moderate increase:** 50-99% population increase from CBC/BBS, WBS or CES
- **Rapid increase:** >100% population increase from CBC/BBS, WBS or CES

3) ***Distribution maps:*** Provides links to online atlas maps and tables showing numbers of occupied squares. Data are from the First Breeding Atlas (1968-72; Sharrock 1976), Second Breeding Atlas (1988-91; **Gibbons *et al.* 1993**) and Winter Atlas (1981/82 - 1983/84; Lack 1986). Maps are not yet available online for Red-throated Diver, Goosander, Hen Harrier, Buzzard, Hobby and Peregrine, for which some of the original data were confidential (see **Atlases species help**).

4) ***Status summary:*** This section provides a brief summary of the trends detailed for the species and indicates why such changes might have occurred, with reference to any published information, if this is known.

5) ***Population trend graphs:*** The first shows the most representative long-term trend in abundance for the species, and is followed after the table by further graphs from other schemes, including BBS graphs for separate UK countries, as available. If no suitable long-term trend is available then the BBS trend for the UK is shown. **Methods (Section 2)** provides details about how the graphs are calculated for each scheme. For CBC/BBS, CBC and WBS, the graphs show a smoothed line (blue) and its 85% confidence limits (green); for CES, Heronries Census and BBS, annual estimates are shown (blue) together with their 85% or 95% (BBS) confidence limits (green), and for the first two schemes a smoothed line (red).

6) ***Population trends table:*** This table provides details of summarised percentage changes in population size, over the maximum period from each source, and from the past 25 years, 10 years and 5 years, where these figures are available. Further columns indicate the years included, the average number of census plots included in the analysis for each year, the percentage change (an increase if presented with no sign) and the upper and lower 90% confidence limits of that change. Where the confidence interval does not include zero change, population declines are regarded as statistically significant. The '**Alert**' column indicates where a statistically significant population decline is estimated to be of 50% or more (>50) or between 25 and 49% (>25) (see **Alerts, Section 2.8** for further details). The '**Comment**' column lists any caveats that must be considered when interpreting the estimates. The caveats are:

- **Small sample:** For CBC, WBS and CES data, a mean sample size of less than 20 (but more than 10) census plots was available; for BBS data from individual countries, a mean sample of less than 40 (but more than 30) plots was available.

- **Unrepresentative?:** Where joint CBC/BBS trends are reported, the trends are always considered to be representative for the region concerned.The CBC data may inadequately represent the population as a whole. This judgment was made either because the species' average abundance in 10-km squares containing CBC plots was less than that in other occupied 10-km squares, as measured by Breeding Atlas timed counts or frequency indices (**Gibbons *et al.* 1993**), or, where these figures could not be calculated, on expert opinion.

7) ***Productivity trends table:*** This provides details of changes in productivity since 1968 (or a more recent year, depending on the availability of data). It lists the period of years concerned, the mean annual sample, the type of trend ("curvilinear" is for a significant quadradic trend, "linear" is for a significant linear trend, "none" is where the linear trend is not significantly different from horizontal),

the predicted values (from the appropriate regression) for the first and last years and their difference (where the trend is significant), and any caveats that must be considered when interpreting the data. Changes are presented either in the units given or as percentages, and are increases unless a minus sign is shown. The caveat '**Small sample**' is given when the mean number of nest record cards contributing annually was in the range 10-30, or when the mean annual number of CES plots recording the species was less than 20 (but more than 10).

8) ***Productivity graphs:*** Graphs from Constant Effort Sites Scheme or Nest Record Scheme data illustrate trends in productivity. For NRS data, annual means (averages) are shown in green, with error bars to denote ±1 standard error; quadratic or linear regression lines (in black) and the upper and lower 95% confidence limits of these lines (in blue) are also shown. For CES data, the annual values are plotted (in blue) with their 85% confidence intervals (in green) and a smoothed line (red) is put through these points (see **Section 2.6** for details).

Use 'Species quick links' box at top of page to move around species pages

Section 4 - Discussion

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4. Discussion

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4.1 The alert system

This report uses a system of alerts agreed between the providers and users of population monitoring information in the UK.The system provides alerts to population declines of 25-49% and of >50% over short, medium and longer terms (5 years, 10 years and 25+ years respectively). These help to highlight the scale and timing of declines as an aid to interpreting the trend graphs presented.Our main emphasis is on long-term declines measured on the length of the longest time series available (usually 35 years) and over 25 years as this is the period that is normally used to determine red and amber listing (**Gregory *et al.* 2002**). Alerts triggered over the short term for individual species should be considered as early warnings, indicating that conservation issues may be developing for these species. However, it is possible that such declines may be due to chance fluctuations in abundance from which the population is able to recover without assistance. The rapid, short-term decline of a suite of similar species should be considered as a stronger indication that potential problems may be developing. Details of the alerts and methodology used in this report are given in the **methods section**.

These alerts are therefore important for the conservation practitioners who need to set priorities for conservation action, but we also hope that they will prove of more general use to other readers of the report. Similar **alerts for wetland birds** are now provided by the Wetland Bird Survey (**Austin *et al.* 2004**).

In this discussion we:

1) Review the latest population change measures and alerts for species that are currently on the **Population Status of Birds** (PSOB) **red** or **amber** lists (declines only) for the UK (**Gregory *et al.* 2002**).

2) Identify species that are not currently on these PSOB lists that have raised alerts on account of long-term declines, and also those species on the list where recovery may be sufficient to downgrade their listing status in the future.

3) Briefly review declines along waterways and in scrub and wetland habitats as shown by the WBS and CES schemes.

4) Review trends over the last 10 years in species that have shown long-term declines, to identify the extent of ongoing declines and evidence of species recovery.

5) Identify those species that have shown rapid long-term population increases.

6) Discuss patterns of changes in breeding performance and relationships between trends in abundance and breeding performance.

7) Summarise the overall patterns found

Except where otherwise indicated our discussion is based on the best long-term trend that is available for each species. These are the trends presented as the main trend graph for each species. Details of estimating and comparing trends are given in the **methods section**. Full details of all trends available for each species are given on the **species pages**. Summary tables of all alerts raised by each scheme are presented in the **appendices**.

It should be noted that a number of species included in the PSOB lists are not covered by this report. Thus tables relating to PSOB list status do not include all species that are on the relevant PSOB list.

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4.2 Latest long-term alerts

4.2.1 Long-term trends of PSOB red-listed species

The species considered here were **red-listed** due to long-term declines of more than 50% over 25 years. The latest long-term population changes and alerts over the maximum period available (usually 35 years) and over 25 years are shown in Table 4.2.1. As expected the results confirm the decline status of all of the 16 species concerned. All changes fire alerts except for the 31-year change for **Lesser Spotted Woodpecker** that has very wide confidence limits and is thus not statistically significant. **Marsh Tit** and **Song Thrush** now show declines of less than 50% over 25 years, mainly reflecting the fact that their long-term declines started more than 25 years ago. **Reed Bunting** now has both long-term and 25-year declines of between 25% and 50%. Its population increased between 1967 and 1975 before the rapid decline that gave rise to its current conservation listing.

Table 4.2.1 Long-term population changes over the longest available period (usually 35 years) and 25 years for species that are currently on the PSOB red list. The table is ordered by decline over the longest available time period.

Species	Period (yrs)	Source	Change (%)	Lower limit	Upper limit	Alert	Comment
Tree Sparrow	35	CBC/BBS England	-97	-99	-94	>50	
Tree Sparrow	25	CBC/BBS England	-96	-99	-93	>50	
Corn Bunting	35	CBC/BBS UK	-87	-93	-79	>50	
Corn Bunting	25	CBC/BBS UK	-88	-94	-81	>50	
Grey Partridge	35	CBC/BBS UK	-86	-91	-81	>50	
Grey Partridge	25	CBC/BBS UK	-88	-91	-83	>50	
Spotted Flycatcher	35	CBC/BBS UK	-85	-90	-78	>50	
Spotted Flycatcher	25	CBC/BBS UK	-81	-87	-74	>50	
Starling	35	CBC/BBS England	-80	-86	-73	>50	
Starling	25	CBC/BBS England	-76	-81	-68	>50	
Turtle Dove	35	CBC/BBS UK	-77	-87	-65	>50	
Turtle Dove	25	CBC/BBS UK	-77	-87	-68	>50	
Willow Tit	35	CBC/BBS UK	-77	-90	-60	>50	
Willow Tit	25	CBC/BBS UK	-80	-90	-63	>50	
House Sparrow	25	CBC/BBS England	-69	-77	-58	>50	
Linnet	35	CBC/BBS England	-68	-76	-60	>50	
Linnet	25	CBC/BBS England	-54	-63	-42	>50	
Marsh Tit	35	CBC/BBS UK	-63	-75	-49	>50	
Marsh Tit	25	CBC/BBS UK	-36	-51	-18	>25	

Lesser Spotted Woodpecker	31	CBC to 1999	-60	-81	40		Small sample
Lesser Spotted Woodpecker	25	CBC to 1999	-73	-86	-31	>50	Small sample
Skylark	35	CBC/BBS England	-60	-68	-52	>50	
Skylark	25	CBC/BBS England	-61	-66	-56	>50	
Yellowhammer	35	CBC/BBS UK	-54	-64	-42	>50	
Yellowhammer	25	CBC/BBS UK	-53	-61	-45	>50	
Bullfinch	35	CBC/BBS UK	-53	-62	-44	>50	
Bullfinch	25	CBC/BBS UK	-52	-61	-42	>50	
Song Thrush	35	CBC/BBS UK	-51	-58	-44	>50	
Song Thrush	25	CBC/BBS UK	-33	-43	-25	>25	
Reed Bunting	35	CBC/BBS UK	-34	-49	-15	>25	
Reed Bunting	25	CBC/BBS UK	-48	-57	-37	>25	

See **Help** for information on category definitions.

4.2.2 Long-term trends of PSOB amber-listed species

The species considered here were **amber-listed** due to long-term declines of between 25% and 49% over 25 years. The amber list category also included a number of species where the best trend estimates show declines of more that 50% but the trend data are sparse or may be unrepresentative. The latest long-term population changes and alerts over the maximum period available (usually 35 years) and over 25 years are shown in Table 4.2.2. As expected the results confirm the decline status of most of the 16 species concerned.

Table 4.2.2 Long-term population changes over the longest available period (usually 35 years) and 25 years for species that are currently on the PSOB amber list due to population declines. The table is ordered by decline over the longest available time period.

Species	Period (yrs)	Source	Change (%)	Lower limit	Upper limit	Alert	Comment
Lesser Redpoll	35	CBC/BBS England	-90	-97	-78	>50	
Lesser Redpoll	25	CBC/BBS England	-97	-99	-94	>50	
Tree Pipit	35	CBC/BBS England	-80	-90	-64	>50	
Tree Pipit	25	CBC/BBS England	-81	-89	-68	>50	
Woodcock	31	CBC to 1999	-74	-88	-49	>50	Small sample
Woodcock	25	CBC to 1999	-76	-88	-51	>50	Small sample
Yellow Wagtail	35	CBC/BBS UK	-67	-86	-30	>50	
Yellow Wagtail	25	CBC/BBS UK	-66	-81	-42	>50	
House Martin	35	CBC/BBS England	-58	-86	34		
House Martin	25	CBC/BBS England	-61	-85	36		
Willow Warbler	35	CBC/BBS England	-58	-70	-45	>50	
Willow Warbler	25	CBC/BBS England	-53	-63	-41	>50	
Cuckoo	35	CBC/BBS England	-56	-68	-43	>50	
Cuckoo	25	CBC/BBS England	-56	-66	-46	>50	

Redshank	27	WBS waterways	-44	-85	-6	>25	Small sample
Redshank	25	WBS waterways	-47	-85	-14	>25	Small sample
Meadow Pipit	35	CBC/BBS England	-39	-73	-3	>25	
Meadow Pipit	25	CBC/BBS England	-46	-69	-28	>25	
Dunnock	35	CBC/BBS UK	-38	-45	-28	>25	
Dunnock	25	CBC/BBS UK	-30	-39	-22	>25	
Mistle Thrush	35	CBC/BBS UK	-36	-46	-21	>25	
Mistle Thrush	25	CBC/BBS UK	-37	-45	-26	>25	
Lapwing	35	CBC/BBS UK	-31	-62	4		
Lapwing	25	CBC/BBS UK	-51	-63	-37	>50	
Grey Wagtail	27	WBS waterways	-26	-44	-5	>25	
Grey Wagtail	25	WBS waterways	-12	-31	7		
Nightingale	18	CES adults	-13	.	.		Small sample
Kestrel	35	CBC/BBS England	5	-26	54		
Kestrel	25	CBC/BBS England	-31	-44	-11	>25	
Goldcrest	35	CBC/BBS England	45	-21	205		
Goldcrest	25	CBC/BBS England	-29	-51	-9	>25	

See **Help** for information on category definitions.

Six species show significant declines of greater than 50% and could thus be candidates for future red listing. Three of these, **Lesser Redpoll**, **Tree Pipit** and **Woodcock**, are amber-listed as a result of data limitations, and there has been no substantial change in the information available on their declines. Three others, **Yellow Wagtail**, **Willow Warbler** and **Cuckoo**, have been subject to on-going declines that have now passed the 50% threshold, although it should be noted that for the latter two species the long-term trend data are only from England. The serious nature of the **Yellow Wagtail** decline is supported by both WBS (-92% over 25 years) and BBS (-17% over 9 years) data. BBS data indicate that for the UK as a whole **Willow Warblers** and **Cuckoos** have continued to decline over the last 9 years, but both species now appear to be stable or increasing in Scotland.

Our best estimate of long-term change in the English **House Martin** population now also shows a decline of over 50% but it is not significantly different from no change. Thus no alerts are raised for this species. Therefore it is probably best to regard this species as being data defficient rather than as a potential candidate for red listing. BBS data indicate that **House Martin** numbers have been stable or increasing since 1994.

Grey Wagtails have been increasing since the late-1990s, and as a result of this their 25-year decline is now only 12%, although the decline over the longest period for which we can measure changes in their populations (27 years) remains 26%. If the positive trend continues they might be removed from the amber list at a future revision. **Kestrel** and **Lapwing** show an opposite pattern to **Grey Wagtail**, with smaller declines over 35 years than 25 years, reflecting modest increases prior to the declines that are now a cause of concern. **Goldcrest** is a difficult species for status assessments because its populations show wide fluctuations and may not have been well monitored prior to the start of the BBS. Numbers actually increased by 45% over 35 years but declined by 29% over 25 years. More recently numbers have approximately doubled over the last 10 years and it is doubtful that the status of this species should be of particular concern.

4.2.3 Long-term declines of species that are not currently red- or amber-listed (for declines)

We identified only five species that are currently showing long-term declines of greater than 25% but are not currently included on either the red or amber lists (Table 4.2.3). Two species, **Little Grebe** and **Whitethroat**, appear to have experienced declines of greater than 50%. The **Little Grebe** data should be treated with caution as they are based on a small sample from linear waterways. WBS shows an ongoing decline over the last 10 years while BBS shows an increase for the UK as a whole. The long-term **Whitethroat** decline results from the well-documented crash between 1968 and 1969 (**Winstanley *et al.* 1974**), with numbers having shown limited

signs of recovery over the last 25 years.

Table 4.2.3 Long-term population changes over the longest available period (usually 35 years) and 25 years for species that have declined by more than 25% but are not currently on the PSOB red or amber lists (for declines). The table is ordered by decline over the longest available time period.

Species	Period (yrs)	Source	Change (%)	Lower limit	Upper limit	Alert	Comment
Little Grebe	27	WBS waterways	-68	-84	-29	>50	Small sample
Little Grebe	25	WBS waterways	-76	-88	-41	>50	Small sample
Whitethroat	35	CBC/BBS UK	-64	-75	-53	>50	
Whitethroat	25	CBC/BBS UK	36	4	72		
Red-legged Partridge	35	CBC/BBS UK	-30	-56	13		
Red-legged Partridge	25	CBC/BBS UK	-48	-65	-28	>25	
Common Sandpiper	27	WBS waterways	-29	-45	-13	>25	
Common Sandpiper	25	WBS waterways	-29	-44	-15	>25	
Lesser Whitethroat	35	CBC/BBS UK	-20	-45	18		
Lesser Whitethroat	25	CBC/BBS UK	-27	-44	-1	>25	

See Help for information on category definitions.

Two other species, **Common Sandpiper** and **Lesser Whitethroat**, could all be candidates for future inclusion on the amber list. **Lesser Whitethroat** should be of particular concern because the 27% decline from CBC/BBS over the last 27 years is consistent with a 56% decline on CES sites over the last 18 years and a 39% decline measured by the BBS over the last 9 years. **Red-legged Partridge** declined by 48% over the last 25 years but would not be a candidate for amber listing because the population is introduced.

4.2.4 Declines on WBS plots

The Waterways Bird Survey supplements the results from more broadly based schemes, such as CBC and BBS, by measuring trends in the bird populations of linear waterways. For a few waterways habitat specialists such as **Grey Wagtail** WBS provides our best information on population trends but for several others it provides supplementary information from this sensitive habitat. Long-term declines of greater than 25% recorded from WBS plots are listed in Table 4.2.4.

Table 4.2.4 Population declines of greater than 25% recorded by the Waterways Bird Survey between 1975 and 2002.

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Yellow Wagtail	27	21	-92	-97	-85	>50	
Reed Bunting	27	52	-69	-78	-49	>50	
Little Grebe	27	17	-68	-84	-29	>50	Small sample
Pied Wagtail	27	66	-47	-61	-35	>25	
Redshank	27	19	-44	-85	-6	>25	Small sample
Common Sandpiper	27	26	-29	-45	-13	>25	
Grey Wagtail	27	56	-26	-44	-5	>25	

See Help for information on category definitions.

The trends for **Little Grebe**, **Redshank**, **Common Sandpiper** and **Grey Wagtail** have already been discussed above while those for **Yellow Wagtail** and **Reed Bunting** are consistent with those reported from CBC/BBS. The **Pied Wagtail** decline of 47% is interesting because in contrasts markedly with the position in the rest of the

country where populations have recently been increasing. Over the 25-year period 1977 to 2002 **Pied Wagtails** declined by 41% on linear waterways compared with only a 5% decrease in the UK, as shown by the CBC/BBS trend. The cause of the decline on waterways is currently unknown.

4.2.5 Declines on CES plots

The **Constant Effort Sites Scheme** provides trends from standardised ringing in scrub and wetland habitats. It is our best scheme for monitoring bird populations inhabiting reed beds but its main objective is to collect integrated data on relative abundance, productivity and survival for a suite of species. The longest trends currently available from the CES cover a period of 18 years (Table 4.2.5).

Table 4.2.5 Population declines of greater than 25% recorded by the Constant Effort Sites Scheme between 1984 and 2002.

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Linnet	18	20	-94	.	.	[>50*]	
Lesser Redpoll	18	19	-74	.	.	[>50*]	Small sample
Willow Warbler	18	89	-60	.	.	[>50*]	
Spotted Flycatcher	18	16	-59	.	.	[>50]	Small sample
Lesser Whitethroat	18	41	-56	.	.	[>50*]	
Willow Tit	18	22	-53	.	.	[>50]	
Reed Bunting	18	59	-51	.	.	[>50*]	
Whitethroat	18	58	-34	.	.	[>25]	
Song Thrush	18	79	-26	.	.	[>25*]	

See **Help** for information on category definitions.

Most of the species that are declining on CES sites also show similar trends from CBC/BBS data. **Linnet**, **Spotted Flycatcher**, **Willow Tit**, **Reed Bunting** and **Song Thrush** are already red-listed while **Lesser Redpoll** and Willow Warbler are amber-listed. The declines of **Lesser Whitethroat** and **Whitethroat** have also been discussed above (**section 4.2.3**). Both species are doing less well on CES sites than in the UK as a whole. Over the 10-year period 1992 to 2002 **Whitethroats** increased by 43% in the UK but decreased by 21% at CES sites. Similarly **Lesser Whitethroats** declined by 17% in the UK as a whole but by 58% on CES sites. Longer-term comparisons show a similar picture. Numbers of juveniles captured at CES sites show very similar patterns of decline to adult captures for both species. It is unclear why these two species are doing so poorly on CES sites as many of these are located in the good quality scrub habitats that are preferred by these species.

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4.3 Ten-year trends and evidence for species recovery

If the status of species that have shown long-term declines was now improving we would expect to find more positive trends in recent years compared with the earlier part of the time series. To examine this we list here the best change estimates over the most recent ten-year period for which we have estimates (1992-2002) for all of the declining species listed in the previous section of this report (Table 4.3).

Table 4.3 Best estimates of population change over the last 10 years (1992-2002) for all species identified as having long-term declines of greater than 25%.

Species	Period (yrs)	Source	Change (%)	Lower limit	Upper limit	Alert	Comment
Lesser Redpoll	10	CBC/BBS England	-71	-90	-54	>50	
Willow Tit	10	CBC/BBS UK	-60	-76	-41	>50	
Tree Pipit	10	CBC/BBS England	-55	-70	-35	>50	
Lesser Spotted Woodpecker	10	CBC to 1999	-51	-75	-22	>50	Small sample
Little Grebe	10	WBS waterways	-49	-65	-30	>25	Small sample
Turtle Dove	10	CBC/BBS UK	-48	-58	-36	>25	
Cuckoo	10	CBC/BBS England	-46	-51	-40	>25	
Starling	10	CBC/BBS England	-46	-50	-41	>25	
Corn Bunting	10	CBC/BBS UK	-45	-60	-30	>25	
Grey Partridge	10	CBC/BBS UK	-43	-52	-31	>25	
Spotted Flycatcher	10	CBC/BBS UK	-43	-54	-29	>25	
Woodcock	10	CBC to 1999	-40	-62	-11	>25	Small sample
Redshank	10	WBS waterways	-39	-52	-23	>25	Small sample
Yellow Wagtail	10	CBC/BBS UK	-38	-60	-27	>25	
Willow Warbler	10	CBC/BBS England	-29	-35	-22	>25	
Yellowhammer	10	CBC/BBS UK	-26	-32	-20	>25	
Common Sandpiper	10	WBS waterways	-24	-37	-12		
Meadow Pipit	10	CBC/BBS England	-23	-38	-6		
Skylark	10	CBC/BBS England	-21	-26	-16		
House Sparrow	10	CBC/BBS England	-21	-33	-11		
Tree Sparrow	10	CBC/BBS England	-20	-65	0		
Lesser Whitethroat	10	CBC/BBS UK	-17	-28	-2		
Bullfinch	10	CBC/BBS UK	-12	-21	-2		

Marsh Tit	10	CBC/BBS UK	-11	-26	4		
Reed Bunting	10	CBC/BBS UK	-11	-19	3		
House Martin	10	CBC/BBS England	-9	-39	27		
Red-legged Partridge	10	CBC/BBS UK	-9	-20	3		
Lapwing	10	CBC/BBS UK	-8	-22	7		
Mistle Thrush	10	CBC/BBS UK	-8	-15	3		
Kestrel	10	CBC/BBS England	-6	-19	6		
Linnet	10	CBC/BBS England	-6	-18	4		
Dunnock	10	CBC/BBS UK	16	9	24		
Song Thrush	10	CBC/BBS UK	20	11	26		
Grey Wagtail	10	WBS waterways	23	11	35		
Whitethroat	10	CBC/BBS UK	43	29	55		
Nightingale	10	CES adults	44	.	.		Small sample
Goldcrest	10	CBC/BBS England	66	30	85		

See **Help** for information on what the categories mean

The 37 species listed include 16 from the red list, 16 declining species that are amber-listed on account of population declines and 5 species that are not formally listed as declining. Six species, **Dunnock**, **Song Thrush**, **Grey Wagtail**, **Whitethroat**, **Nightingale** and **Goldcrest** show positive trends over the last 10 years. The figure for **Nightingale** should be treated with caution as it is based on a small amount of data from CES sites. The steady increase in the red-listed **Song Thrush** since about 1997 is particularly encouraging.

The rate of decline of 25% over 25 years that is used as a threshold for amber listing is equivalent to a decline of 10.9% over 10 years (assuming both have the same annual rate of change). A further six species, **House Martin**, **Red-Legged Partridge**, **Lapwing**, **Mistle Thrush**, **Kestrel** and **Linnet**, have negative ten-year changes involving declines of less than 11%. None of the 10-year declines for these six species are statistically significant. Thus our data suggest that the declines of these species appear to be levelling off although there is as yet no clear indication of recovery.

Ten-year changes for the remaining 25 species in Table 4.3 indicate ongoing declines, with rates equivalent to at least 25% over 25 years. Four species, **Lesser Redpoll**, **Willow Tit**, **Tree Pipit** and **Lesser Spotted Woodpecker**, have declined by more than 50% over the last 10 years alone. The on-going declines of so many of the species listed in Table 4.3 must be a cause of serious conservation concern.

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4.4 Increasing species

Those species that have increased by more than 50% over the past 35 years on CBC/BBS plots and 27 years on WBS plots are shown in Tables 4.4.1 & 4.4.2 respectively. Four identifiable groups stand out: corvids - **Jackdaw**, **Carrion Crow** and **Magpie**; doves - **Woodpigeon**, **Stock Dove** and **Collared Dove**; insectivores; and waterbirds. Corvids appear to have benefited from relaxation and decrease of gamekeeping activities in the countryside in recent years and the increased use of Brassica crops (particularly oilseed rape) has probably been beneficial to the doves. Numbers of **Pheasants** have also increased but the index for this species is difficult to interpret because it may be influenced by releases of captive reared birds.

The majority of increasing resident insectivores are species that are associated with woodland but also common in gardens: **Green Woodpecker**, **Great Spotted Woodpecker**, **Nuthatch**, **Long-tailed Tit**, **Great Tit** and **Wren**. The reasons for these increases are presently unclear. **Pied Wagtail** has increased in number by 97% on CBC/BBS plots over 35 years, but declined by 47% on WBS plots over the past 27 years. The former survey is likely to be more representative of the UK population as a whole.

Two migrant insectivorous species have also exhibited large increases in abundance: **Reed Warbler** and **Blackcap**. CBC/BBS data indicate that both species have approximately doubled in number over the last 35 years. Reed Warblers have also increased by 60% on WBS plots over the last 21 years, although their numbers have fallen by 20% at CES sites over the last 18 years. Again, the reasons for these population increases are currently unclear.

Table 4.4.1 Population increases of >50% for CBC/BBS 1967-2002. The figures refer to UK indices unless otherwise stated.

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Buzzard	35	131	407	240	1287		
Collared Dove	30	339	384	192	635		Change from 1972
Mute Swan	35	59	247	49	646		
Great Spotted Woodpecker	35	230	230	146	446		
Coot	35	73	230	127	692		
Green Woodpecker	35	188	188	119	292		England
Stock Dove	35	191	188	105	385		England
Mallard	35	320	188	116	255		
Nuthatch	35	129	126	68	230		
Woodpigeon	35	514	126	18	398		
Blackcap	35	391	121	79	191		
Carrion Crow	35	458	110	76	168		England
Magpie	35	472	108	68	150		
Wren	35	622	99	69	124		
Pied Wagtail	35	300	97	48	170		
Reed Warbler	35	43	89	27	260		
Long-tailed Tit	35	238	79	25	152		England
Pheasant	35	348	74	37	154		England
Jackdaw	35	344	73	21	154		
Great Tit	35	555	71	48	94		

See **Help** for information on category definitions.

Many species associated with freshwater habitats are also becoming more abundant.[illegible] The CBC and WBS cannot be said to provide monitoring of a representative portion of the population for most of these species but these results are interesting indicators of changes that may nevertheless be affecting the whole population.[illegible] We can be confident that **Grey Heron** populations have increased in England and Wales over the past 70 years and that **Mallard** populations have increased on both CBC/BBS and WBS plots over the last 35 and 27 years respectively. The increases recorded for **Mute Swan** on both CBC/BBS and WBS plots are likely to be the result of banning the use of lead weights by anglers. The factors responsible for the population increases displayed by **Coot** are currently unclear. **Oystercatcher** have increased markedly on WBS plots over the last 27 years. This finding is consistent with the results of the **Survey of Breeding Waders of Lowland Wet Meadows** which found that numbers of Oystercatchers using these habitats in England and Wales increased by 51% between 1982 and 2002.

Table 4.4.2 Population increases of >50% for WBS waterways 1975-2002

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Mallard	27	59	192	121	282		
Oystercatcher	27	23	103	50	164		
Mute Swan	27	44	70	14	158		
Reed Warbler	21	22	60	15	116		Change from 1981

See **Help** for information on category definitions.

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4.5 Changes in breeding performance

Changes in a range of aspects of breeding performance can be measured under the Nest Record Scheme and the Constant Effort Sites scheme. The former provides information on components of breeding performance *per nesting attempt*. The latter provides an index of breeding performance accrued over *all* nesting attempts in a particular year, combined with the effect of changes in the survival of fledglings once they have left the nest but before they are caught as juveniles a period when losses of young can be high.

Breeding performance may be influenced by a variety of factors, including food availability, predation pressure and weather conditions. Variation in breeding performance may help to influence, and may even be the main demographic factor responsible for determining the size of a population. Conversely, the breeding performance of a population may be negatively related to its size, with productivity decreasing as the number of individuals increases, and vice versa. This relationship may be due to the action of density-dependent factors, such as competition for resources: as numbers increase, competition for resources is likely to increase, possibly resulting in a reduction in productivity. Alternatively, increases in abundance may result from range expansion into new, sub-optimal habitats where breeding performance is poorer and the average productivity of the population is thus lowered, whilst declines may result from the loss of individuals from these sub-optimal habitats, leading to a subsequent increase in average productivity.

4.5.1 Changes in clutch and brood size

Those species exhibiting statistically significant trends in clutch and brood size over the past 34 years are shown in Tables 4.5.1.1 and 4.5.1.2. Although the numbers of species showing increases and decreases in clutch size were approximately equal (13 and 14 species respectively) there were many more species showing increases in brood size (26) than decreases (17) over the same period.

Table 4.5.1.1 Significant trends in clutch size measured between 1968 and 2002

Species	Period (yrs)	Mean annual sample	Trend	Predicted in first year	Predicted in last year	Change	Comment
Long-tailed Tit	34	32	Linear decline	7.65 eggs	6.55 eggs	-1.1 eggs	
Magpie	34	49	Curvilinear	5.57 eggs	4.68 eggs	-0.89 eggs	
Hen Harrier	34	12	Curvilinear	5.56 eggs	4.73 eggs	-0.83 eggs	Small sample
Mute Swan	34	18	Linear decline	5.86 eggs	5.08 eggs	-0.78 eggs	Small sample
Great Tit	34	92	Linear decline	8.23 eggs	7.61 eggs	-0.62 eggs	
Peregrine	34	15	Linear decline	3.64 eggs	3.09 eggs	-0.55 eggs	Small sample
Moorhen	34	93	Linear decline	6.51 eggs	6.05 eggs	-0.46 eggs	
Treecreeper	34	14	Linear decline	5.4 eggs	5.06 eggs	-0.34 eggs	Small sample
Common Sandpiper	34	12	Linear decline	3.96 eggs	3.73 eggs	-0.23 eggs	Small sample
Rook	34	14	Curvilinear	4.15 eggs	3.93 eggs	-0.22 eggs	Small sample
Pied Wagtail	34	59	Linear decline	5.13 eggs	4.95 eggs	-0.18 eggs	
Nightjar	34	15	Linear decline	2 eggs	1.87 eggs	-0.13 eggs	Small sample
Chaffinch	34	85	Curvilinear	4.21 eggs	4.09 eggs	-0.12 eggs	
Sedge Warbler	34	39	Curvilinear	4.95 eggs	4.88 eggs	-0.07 eggs	
Buzzard	34	30	Curvilinear	2.16 eggs	2.18 eggs	0.02 eggs	
Grey Wagtail	34	41	Curvilinear	4.68 eggs	4.79 eggs	0.11 eggs	
Lapwing	34	125	Linear increase	3.69 eggs	3.81 eggs	0.12 eggs	
Mistle Thrush	34	37	Linear increase	3.88 eggs	4.05 eggs	0.17 eggs	
Wren	34	96	Linear increase	5.6 eggs	5.82 eggs	0.22 eggs	
Stonechat	34	26	Linear increase	5.02 eggs	5.25 eggs	0.23 eggs	Small sample
Woodlark	34	15	Curvilinear	3.36 eggs	3.63 eggs	0.27 eggs	Small sample
Dunnock	34	99	Linear increase	3.91 eggs	4.21 eggs	0.3 eggs	
Redstart	34	50	Curvilinear	5.86 eggs	6.19 eggs	0.33 eggs	
Starling	34	78	Linear increase	4.45 eggs	4.82 eggs	0.37 eggs	
Skylark	34	39	Linear increase	3.35 eggs	3.74 eggs	0.39 eggs	
Barn Owl	34	13	Curvilinear	4.3 eggs	4.78 eggs	0.48 eggs	Small sample
Tree Sparrow	34	93	Curvilinear	4.71 eggs	5.19 eggs	0.48 eggs	

See Help for information on category meanings.

Six species (**Nightjar**, **Yellow Wagtail**, **Pied Wagtail**, **Great Tit**, **Long-tailed Tit** and **Chaffinch**)

exhibited decreases in both clutch size and brood size over the period, whilst another eight species (**Dunnock**, **Stonechat**, **Skylark**, **Grey Wagtail**, **Redstart**, **Tree Sparrow**, **Barn Owl** and **Wren**) exhibited increases in both clutch size and brood size. For three species, declines in clutch size were partially (**Magpie**) or fully (**Moorhen** and **Rook**) compensated for by increases in average brood size, suggesting that conditions for young had improved for these species whilst conditions for parent birds during egg formation may have deteriorated.

Table 4.5.1.2 Significant trends in brood size measured between 1968 and 2002

Species	Period (yrs)	Mean annual sample	Trend	Predicted in first year	Predicted in last year	Change	Comment
Great Tit	34	158	Linear decline	7.44 chicks	6.56 chicks	-0.88 chicks	
Blue Tit	34	135	Linear decline	8.32 chicks	7.5 chicks	-0.82 chicks	
Great Spotted Woodpecker	34	15	Curvilinear	3.21 chicks	2.52 chicks	-0.69 chicks	Small sample
Long-tailed Tit	34	26	Curvilinear	6.76 chicks	6.26 chicks	-0.5 chicks	Small sample
House Sparrow	34	95	Curvilinear	3.33 chicks	2.84 chicks	-0.49 chicks	
Yellow Wagtail	34	13	Linear decline	4.84 chicks	4.37 chicks	-0.47 chicks	Small sample
Greenfinch	34	112	Curvilinear	4.02 chicks	3.66 chicks	-0.36 chicks	
Chiffchaff	34	29	Linear decline	5.12 chicks	4.78 chicks	-0.34 chicks	Small sample
Raven	34	56	Linear decline	3.22 chicks	2.89 chicks	-0.33 chicks	
Carrion Crow	34	82	Curvilinear	2.86 chicks	2.61 chicks	-0.25 chicks	Includes Hooded Crow
Pied Wagtail	34	110	Curvilinear	4.43 chicks	4.21 chicks	-0.22 chicks	
Wheatear	34	64	Curvilinear	4.73 chicks	4.58 chicks	-0.15 chicks	
Jackdaw	34	78	Curvilinear	2.6 chicks	2.49 chicks	-0.11 chicks	
Whitethroat	34	59	Curvilinear	4.25 chicks	4.15 chicks	-0.1 chicks	
Nightjar	34	23	Curvilinear	1.81 chicks	1.73 chicks	-0.08 chicks	Small sample
Turtle Dove	34	17	Curvilinear	1.82 chicks	1.81 chicks	-0.01 chicks	Small sample
Chaffinch	34	136	Curvilinear	3.57 chicks	3.56 chicks	-0.01 chicks	
Blackbird	34	117	Curvilinear	3.32 chicks	3.36 chicks	0.04 chicks	
Collared Dove	34	68	Linear increase	1.76 chicks	1.84 chicks	0.08 chicks	
Spotted Flycatcher	34	131	Curvilinear	3.61 chicks	3.69 chicks	0.08 chicks	
Swallow	34	282	Curvilinear	4.07 chicks	4.16 chicks	0.09 chicks	
Magpie	34	86	Curvilinear	3.06 chicks	3.16 chicks	0.1 chicks	
Linnet	34	122	Curvilinear	4.07 chicks	4.2 chicks	0.13 chicks	
Yellowhammer	34	67	Curvilinear	2.96 chicks	3.09 chicks	0.13 chicks	
Grey Wagtail	34	85	Curvilinear	3.93 chicks	4.08 chicks	0.15 chicks	
Reed Bunting	34	62	Linear increase	4.05 chicks	4.21 chicks	0.16 chicks	
Stonechat	34	53	Linear increase	4.69 chicks	4.87 chicks	0.18 chicks	
Barn Owl	34	69	Curvilinear	3 chicks	3.19 chicks	0.19 chicks	
Dunnock	34	104	Linear increase	3.45 chicks	3.67 chicks	0.22 chicks	
Willow Warbler	34	134	Curvilinear	5.24 chicks	5.5 chicks	0.26 chicks	
Merlin	34	57	Linear increase	3.5 chicks	3.78 chicks	0.28 chicks	
Kestrel	34	110	Linear increase	3.85 chicks	4.14 chicks	0.29 chicks	
Skylark	34	68	Linear increase	3.14 chicks	3.48 chicks	0.34 chicks	
Corn Bunting	34	12	Curvilinear	3.09 chicks	3.44 chicks	0.35 chicks	Small sample
Wren	34	96	Linear increase	4.78 chicks	5.16 chicks	0.38 chicks	
Redstart	34	88	Curvilinear	5.07 chicks	5.47 chicks	0.4 chicks	
Tree Pipit	34	29	Linear increase	4.35 chicks	4.75 chicks	0.4 chicks	Small sample
Dipper	34	141	Linear increase	3.52 chicks	3.96 chicks	0.44 chicks	
Rook	34	90	Linear increase	2.33 chicks	2.81 chicks	0.48 chicks	
Sparrowhawk	34	78	Curvilinear	3.1 chicks	3.59 chicks	0.49 chicks	
Tree Sparrow	34	104	Linear increase	3.85 chicks	4.52 chicks	0.67 chicks	
Moorhen	34	77	Curvilinear	3.3 chicks	4.43 chicks	1.13 chicks	
Nuthatch	34	57	Curvilinear	4.03 chicks	5.26 chicks	1.23 chicks	

See **Help** for information on category meanings.

Long-term changes in clutch or brood size are associated with long-term population trends in a number of species. Here we highlight those changes that are both statistically significant and likely to be of biological importance.

Declines in population size and brood size were recorded for **Yellow Wagtail** and **House Sparrow**. Both species show reductions of about half a chick per nesting attempt. The BTO project on **Yellow Wagtails**, initiated in 2002, aims to investigate the influence of decreased brood sizes on the abundance of this species. In the case of the **House Sparrow**, population modelling based on BTO data has shown that declines in rural areas were caused by reduced survival rates but that these declines

were mainly halted due to improvements in breeding performance (**Crick *et al.* 2002**). The apparently accelerating reduction in brood size is therefore of some concern. Work by Kate Vincent at the University of Leicester has suggested that insect food for the chicks may be limited in certain situations and recent brood size reductions may be a manifestation of this at a wider scale. However, it should be noted that over the long-term some of the reduction in brood size may have been compensated by reduced nest failure rates at the egg and chick stages.

Several increasing species show increasing brood sizes, particularly **Sparrowhawk**, **Wren**, **Nuthatch** and **Rook**. The return of **Sparrowhawks** into eastern areas of the UK, where populations of songbird prey are greater, may be a factor in this increase. The UK **Nuthatch** population, which has been expanding northwards and has increased considerably in size, has exhibited an increase in average brood size of more than one extra young per nesting attempt. It would seem likely that this has helped to drive the population increase of this species.

Inverse associations between clutch or brood size and population trend are found in some 25 species. Such relationships may arise through density-dependent processes where increased competition leads to reduced clutch or brood sizes at higher population densities. Totals of nine increasing species and 16 decreasing ones show such associations. Notable examples amongst increasing species include **Mute Swan** (clutch size), **Great Spotted Woodpecker** (brood size), **Long-tailed Tit** (clutch and brood size) and **Magpie** (clutch size). Amongst declining species the examples include **Barn Owl** (clutch and brood size), **Skylark** (clutch and brood size), **Tree Sparrow** (clutch and brood size) and **Corn Bunting** (brood size).

4.5.2 Changes in nest failure rates

Statistically significant trends in the daily nest failure rates at the egg and chick stages over the past 34 years are shown in Tables 4.5.2.1 and 4.5.2.2. The number of species exhibiting declines in failure rates at the chick stage (21) was more than double the number exhibiting increases (7), as was the number of species exhibiting declines in failure rates at the egg stage (38 vs. 12).  Thus the general picture is one of improving nesting success.

Table 4.5.2.1 Significant trends in egg-stage daily failure rate of nests

Species	Period (yrs)	Mean annual sample	Trend	Predicted in first year	Predicted in last year	Change	Comment
Jay	34	10	Linear decline	0.0528 nests/day	0.0203 nests/day	-0.0325 nests/day	Small sample
Tree Pipit	34	12	Linear decline	0.0401 nests/day	0.0114 nests/day	-0.0287 nests/day	Small sample
Long-tailed Tit	34	51	Curvilinear	0.0321 nests/day	0.0069 nests/day	-0.0252 nests/day	
Magpie	34	56	Linear decline	0.0283 nests/day	0.0032 nests/day	-0.0251 nests/day	
Redshank	34	33	Linear decline	0.0411 nests/day	0.0171 nests/day	-0.024 nests/day	
Dipper	34	104	Curvilinear	0.0252 nests/day	0.003 nests/day	-0.0222 nests/day	
Woodlark	34	18	Linear decline	0.0355 nests/day	0.015 nests/day	-0.0205 nests/day	Small sample
Snipe	34	17	Linear decline	0.0326 nests/day	0.0154 nests/day	-0.0172 nests/day	Small sample
Yellowhammer	34	63	Curvilinear	0.0503 nests/day	0.0338 nests/day	-0.0165 nests/day	
Wheatear	34	21	Linear decline	0.0217 nests/day	0.0062 nests/day	-0.0155 nests/day	Small sample
Song Thrush	21	324	Linear decline	0.0418 nests/day	0.0278 nests/day	-0.014 nests/day	
Robin	34	176	Curvilinear	0.0242 nests/day	0.0103 nests/day	-0.0139 nests/day	
Treecreeper	34	23	Linear decline	0.0197 nests/day	0.0064 nests/day	-0.0133 nests/day	Small sample
Carrion Crow	34	54	Linear decline	0.0158 nests/day	0.0028 nests/day	-0.013 nests/day	Includes Hooded Crow
Wood Warbler	34	21	Linear decline	0.0197 nests/day	0.0081 nests/day	-0.0116 nests/day	Small sample
Starling	34	121	Linear decline	0.0116 nests/day	0.0031 nests/day	-0.0085 nests/day	
House Sparrow	34	76	Curvilinear	0.0108 nests/day	0.0026 nests/day	-0.0082 nests/day	
Tawny Owl	34	52	Linear decline	0.0099 nests/day	0.0019 nests/day	-0.008 nests/day	Nocturnal species
Redstart	34	75	Linear decline	0.0116 nests/day	0.0036 nests/day	-0.008 nests/day	
Pied Wagtail	34	81	Curvilinear	0.0145 nests/day	0.0072 nests/day	-0.0073 nests/day	
Marsh Tit	34	19	Linear decline	0.0084 nests/day	0.0012 nests/day	-0.0072 nests/day	Small sample
Stock Dove	34	64	Curvilinear	0.0104 nests/day	0.0037 nests/day	-0.0067 nests/day	
Sedge Warbler	34	46	Linear decline	0.013 nests/day	0.0066 nests/day	-0.0064 nests/day	
Greenfinch	34	128	Linear decline	0.0246 nests/day	0.0192 nests/day	-0.0054 nests/day	
Jackdaw	34	48	Linear decline	0.0075 nests/day	0.0024 nests/day	-0.0051 nests/day	
Kestrel	34	39	Linear decline	0.0059 nests/day	0.0009 nests/day	-0.005 nests/day	
Buzzard	34	23	Linear decline	0.0065 nests/day	0.0017 nests/day	-0.0048 nests/day	Small sample
Merlin	34	28	Linear decline	0.0071 nests/day	0.0025 nests/day	-0.0046 nests/day	Small sample
Reed Warbler	34	124	Curvilinear	0.0147 nests/day	0.0102 nests/day	-0.0045 nests/day	
Tree Sparrow	34	121	Curvilinear	0.0072 nests/day	0.0031 nests/day	-0.0041 nests/day	

Barn Owl	34	11	Curvilinear	0.0042 nests/day	0.0004 nests/day	-0.0038 nests/day	Small sample
Sparrowhawk	34	37	Linear decline	0.0046 nests/day	0.0011 nests/day	-0.0035 nests/day	
Great Tit	34	151	Linear decline	0.0065 nests/day	0.003 nests/day	-0.0035 nests/day	
Blue Tit	34	134	Linear decline	0.0053 nests/day	0.0021 nests/day	-0.0032 nests/day	
Curlew	34	25	Curvilinear	0.0291 nests/day	0.0266 nests/day	-0.0025 nests/day	Small sample
Stonechat	34	29	Curvilinear	0.0048 nests/day	0.0037 nests/day	-0.0011 nests/day	Small sample
Swallow	34	217	Curvilinear	0.0028 nests/day	0.0021 nests/day	-0.0007 nests/day	
Raven	34	19	Curvilinear	0.0021 nests/day	0.002 nests/day	-0.0001 nests/day	Small sample
Bullfinch	34	50	Curvilinear	0.0332 nests/day	0.0347 nests/day	0.0015 nests/day	
Dunnock	34	139	Curvilinear	0.0262 nests/day	0.0283 nests/day	0.0021 nests/day	
Linnet	34	151	Curvilinear	0.0158 nests/day	0.0191 nests/day	0.0033 nests/day	
Oystercatcher	34	109	Linear increase	0.0136 nests/day	0.0194 nests/day	0.0058 nests/day	
Lapwing	34	136	Curvilinear	0.0167 nests/day	0.0229 nests/day	0.0062 nests/day	
Moorhen	34	109	Curvilinear	0.014 nests/day	0.021 nests/day	0.007 nests/day	
Willow Warbler	34	69	Curvilinear	0.0112 nests/day	0.0227 nests/day	0.0115 nests/day	
Whinchat	34	16	Linear increase	0.0061 nests/day	0.0203 nests/day	0.0142 nests/day	Small sample
Ringed Plover	34	123	Curvilinear	0.0276 nests/day	0.0433 nests/day	0.0157 nests/day	
Reed Bunting	34	53	Linear increase	0.0069 nests/day	0.0271 nests/day	0.0202 nests/day	
Nightjar	34	20	Linear increase	0.0124 nests/day	0.0364 nests/day	0.024 nests/day	Small sample
Mute Swan	34	25	Curvilinear	0.0077 nests/day	0.0443 nests/day	0.0366 nests/day	Small sample

See **Help** for information on category meanings.

The changes in egg-stage and chick-stage failure rates were both positive for **Mute Swan**, **Nightjar** and **Linnet**. For a further 14 species (**Merlin**, **Barn Owl**, **Sand Martin**, **Robin**, **Redstart**, **Stonechat**, **Reed Warbler**, **Magpie**, **Jackdaw**, **Carrion Crow**, **Starling**, **House Sparrow**, **Tree Sparrow** and **Yellowhammer**), egg-stage and chick-stage failure rates both decreased. For a further five species (**Woodlark**, **Swallow**, **Whinchat**, **Long-tailed Tit** and **Bullfinch**), declines in the failure rate at one stage were partially cancelled out by increases in failure rates at the other, suggesting that different factors may influence productivity at egg and chick stages.

Table 4.5.2.2 Significant trends in chick-stage daily failure rate of nests

Species	Period (yrs)	Mean annual sample	Trend	Predicted in first year	Predicted in last year	Change	Comment
Grey Heron	34	28	Linear decline	0.058 nests/day	0.0006 nests/day	-0.0574 nests/day	Non-breeders include
Corn Bunting	34	11	Linear decline	0.0362 nests/day	0.0096 nests/day	-0.0266 nests/day	Small sample
Meadow Pipit	34	65	Linear decline	0.0277 nests/day	0.0113 nests/day	-0.0164 nests/day	
Magpie	34	55	Linear decline	0.017 nests/day	0.0018 nests/day	-0.0152 nests/day	
Yellowhammer	34	51	Curvilinear	0.0459 nests/day	0.0337 nests/day	-0.0122 nests/day	
House Sparrow	34	75	Linear decline	0.0141 nests/day	0.003 nests/day	-0.0111 nests/day	
Reed Warbler	34	89	Linear decline	0.0193 nests/day	0.0086 nests/day	-0.0107 nests/day	
Jackdaw	34	47	Linear decline	0.0128 nests/day	0.0027 nests/day	-0.0101 nests/day	
Grey Wagtail	34	61	Curvilinear	0.0155 nests/day	0.007 nests/day	-0.0085 nests/day	
Blackbird	34	113	Linear decline	0.0294 nests/day	0.0212 nests/day	-0.0082 nests/day	
Merlin	34	30	Linear decline	0.0103 nests/day	0.0025 nests/day	-0.0078 nests/day	Small sample
Robin	34	148	Curvilinear	0.0242 nests/day	0.0167 nests/day	-0.0075 nests/day	
Collared Dove	34	52	Linear decline	0.0182 nests/day	0.0113 nests/day	-0.0069 nests/day	
Stonechat	34	48	Linear decline	0.0146 nests/day	0.0078 nests/day	-0.0068 nests/day	
Redstart	34	53	Linear decline	0.011 nests/day	0.0055 nests/day	-0.0055 nests/day	
Tree Sparrow	34	87	Linear decline	0.0141 nests/day	0.0087 nests/day	-0.0054 nests/day	
Carrion Crow	34	45	Linear decline	0.0068 nests/day	0.0021 nests/day	-0.0047 nests/day	Includes Hooded Crow
Starling	34	146	Linear decline	0.0062 nests/day	0.0023 nests/day	-0.0039 nests/day	
Whinchat	34	29	Curvilinear	0.0269 nests/day	0.0234 nests/day	-0.0035 nests/day	Small sample
Bullfinch	34	34	Curvilinear	0.0332 nests/day	0.0298 nests/day	-0.0034 nests/day	
Barn Owl	34	41	Linear decline	0.0025 nests/day	0.0002 nests/day	-0.0023 nests/day	
Swallow	34	191	Linear increase	0.0028 nests/day	0.0049 nests/day	0.0021 nests/day	
Mute Swan	34	19	Linear increase	0.0005 nests/day	0.0029 nests/day	0.0024 nests/day	Small sample
Linnet	34	108	Linear increase	0.0151 nests/day	0.0218 nests/day	0.0067 nests/day	
Long-tailed Tit	34	35	Linear increase	0.0078 nests/day	0.0163 nests/day	0.0085 nests/day	
Woodlark	34	26	Linear increase	0.0143 nests/day	0.0335 nests/day	0.0192 nests/day	Small sample
Nightjar	34	19	Linear increase	0.0023 nests/day	0.0247 nests/day	0.0224 nests/day	Small sample

See **Help** for information on categoriy meanings.

Long-term changes in egg-stage or chick-stage nest failure rates are associated with long-term population trends in a number of species. Here we highlight those changes that are both statistically significant and likely to be of biological importance.

Increased nest failure rates were associated with negative long-term trends in population size for six species, and may have contributed to the observed population declines. These species were **Lapwing** (egg stage), **Nightjar** (both stages), **Dunnock** (egg stage), **Willow Warbler** (egg stage), **Linnet** (both stages) and **Reed Bunting** (egg stage). Although **Nightjar** is included in this list of declining species on account of its red-listed status, it should be noted that recent surveys show a population increase. Reductions in breeding performance at the egg stage have been implicated in more detailed analyses of the population declines of both **Lapwing** and **Linnet** (**Peach *et al.* 1994**; **Siriwardena *et al.* 2000b**). It has also been suggested that poor breeding performance may be preventing the recovery of Reed Bunting populations (**Peach *et al.* 1999**).

Eleven species showed clear associations between long-term increases in abundance and long-term reductions in nest failure rates. **Sparrowhawk**, **Buzzard**, **Stock Dove**, **Pied Wagtail** and **Great Tit** experienced reduced nest failure rates at the egg stage, while **Grey Heron** and **Collared Dove** showed reduced failure rates at the chick stage. The remaining four species, **Robin**, **Magpie**, **Jackdaw** and **Carrion Crow**, showed reduced failure rates at both the egg and chick stages. Corvids, such as **Magpie**, **Carrion Crow** and **Jackdaw**, appear to have benefited from improvements in nesting success at the egg stage, as have raptors such as **Sparrowhawk** and **Buzzard**. Decreased persecution and reduction in the use of pesticides are likely to have been important factors in the recovery of these species. The improvements in the nesting success of **Stock Dove** could have a major impact on the size of the population, given the high number of breeding attempts made by this species each year. **Grey Heron** populations have increased over the last 70 years, and improvements in chick-stage nest survival may have played a part in this increase, perhaps aided by the declining impact of organochlorine pesticides and improvements in water quality of riverine and standing water bodies. Decreased chick-stage failure rates of **Collared Doves** may have aided the rapid growth of the UK population over the last 34 years, particularly as this species makes a relatively large number of breeding attempts per year.

Inverse associations between changes in egg- or chick-stage nest survival and population trend are found in some 17 species, while a further three species show such a relationship at one stage but a compensatory one at the other stage. Such relationships may arise through density-dependent processes where increased competition leads to increased failure rates at higher population densities. Two increasing species showed long-term increases in nest failure rates. Failure rates of **Mute Swans** increased at both the egg and chick stages while failure rates of **Oystercatchers** increased at the egg stage. Some 15 declining species showed evidence of improving nesting success. **Snipe**, **Redshank**, **Tree Pipit**, **Song Thrush**, **Wood Warbler** and **Marsh Tit**, showed decreased failure at the egg stage while **Meadow Pipit**, **Grey Wagtail** and **Corn Bunting**, showed decreased chick-stage failure rates. The remaining six species, **Merlin**, **Barn Owl**, **Starling**, **House Sparrow**, **Tree Sparrow** and **Yellowhammer** show decreased failure rates at both stages.

4.5.3 Changes in productivity from CES

The CES results start in 1984, so the changes in productivity shown in Table 4.5.3 cover roughly half the time period of the Nest Record Scheme results. Statistical significance is not available for these trends at present, although a good indication can be obtained by inspecting the confidence intervals for the annual indices that are presented on the individual species graphs. The CES productivity index provides a relative measure of annual variation in productivity that integrates the effects of fledglings produced per attempt, number of nesting attempts and immediate post-fledging survival. The CES is unique in providing relative measures of adult abundance and productivity from the same set of sites in wetland and scrub habitats. Overall, 12 species exhibit declines of >25% in productivity while none show an improvement of >25%.

Four species, **Nightingale**, **Linnet**, **Greenfinch** and **Lesser Redpoll**, all show greater than 50% declines in productivity over the last 18 years, while a further eight species show reductions in relative productivity of between 25% and 50%. Six of the 12 species showing these large productivity declines (**Linnet**, **Lesser Redpoll**¸ **Song Thrush**, **Reed Bunting**, **Whitethroat** and **Willow Warbler**) have experienced population declines of greater than 25% both on CES sites and more widely (based on CBC/BBS figures). For **Linnet** there is good evidence that variation in productivity has been important in driving the decline (**Siriwardena *et al.* 2000b**), but for **Song Thrush**, **Reed Bunting**, **Whitethroat** and **Willow Warbler** other work indicates that variation in survival rates is likely to have been a more important contributor to population changes (**Robinson *et al.* 2004**, **Peach *et al.* 1999**, **Baillie & Peach 1992**, **Peach *et al.* 1995**). The large decline in **Nightingale** productivity may have contributed to the

complex changes in its distribution shown by the **1999 survey**, which identified decreases in abundance over large parts of the species' range. The five other species with marked reductions in productivity on CES sites have not experienced related declines in abundance, either on CES sites or more widely. **Greenfinch**, **Garden Warbler**, **Sedge Warbler**, **Blue Tit** have had relatively stable populations while the moderate decline in **Blackbirds** is now well below the 25% alert threshold. The causes of the productivity declines observed in these species are unclear and warrant further detailed investigation.

Three species with long-term declines in abundance of greater than 50% on CES sites, **Willow Tit**, **Spotted Flycatcher** and **Lesser Whitethroat**, all show stable or slightly increased productivity over the last 18 years.

Looking at the CES data set as a whole, 22 species show some decline in productivity while only five show increases. By comparison 12 species show long-term declines, 10 are stable and five have increased. This strong preponderance in trends towards lower productivity requires urgent and more detailed investigation.

Table 4.5.3 Changes in productivity indices (percentage juveniles) for CES 1984-2002 (18 years) calculated from smoothed trend

Species	Period (yrs)	Mean annual sample	Change	Comment
Nightingale	18	11	-82%[>50]	Small sample
Linnet	18	23	-70%[>50]	
Greenfinch	18	45	-65%[>50]	
Lesser Redpoll	18	20	-65%[>50]	
Garden Warbler	18	77	-46%[>25]	
Sedge Warbler	18	68	-43%[>25]	
Song Thrush	18	86	-38%[>25]	
Blue Tit	18	98	-37%[>25]	
Reed Bunting	18	62	-36%[>25]	
Whitethroat	18	73	-30%[>25]	
Willow Warbler	18	96	-29%[>25*]	
Blackbird	18	96	-26%[>25]	
Robin	18	97	-24%	
Great Tit	18	95	-21%	
Long-tailed Tit	18	81	-15%	
Goldfinch	18	36	-15%	
Blackcap	18	92	-12%	
Dunnock	18	97	-10%	
Chiffchaff	18	83	-10%	
Chaffinch	18	82	-8%	
Willow Tit	18	35	-7%	
Wren	18	97	-5%	
Spotted Flycatcher	18	22	5%	
Bullfinch	18	83	6%	
Treecreeper	18	64	12%	
Reed Warbler	18	59	14%	
Lesser Whitethroat	18	55	15%	

See **Help** for information on category meanings.

4.5.4 Changes in average laying dates

Over the past 25 years many species have exhibited a trend towards progressively earlier clutch initiation (**Crick *et al.*1997**) with laying dates showing curvilinear responses over the past 50 years as spring temperatures have cooled and then warmed (**Crick & Sparks 1999**).Table 4.5.4 confirms that over the past 34 years the majority of species exhibiting significant trends show an advancement of laying dates rather than a delay.Thus 31species are laying between 26 days and 1 day earlier, on average, than they were 34 years ago.Four species, **Great Tit**, **Reed Warbler**, **Wren** and **Blackbird**, are added to the list of earlier layers published in the previous report on this series. There are no taxonomic or ecological associations between the species showing such changes, and they seem to occur across a wide range of species (**Crick *et al.* 1997**). Only two species show significant changes towards later laying, both of which suffer from small sample sizes and appear to be driven by a small number of outlying late years toward the end of the time series. It is likely that the laying dates of the majority of those species that do not show a significant trend in timing of laying are related to some aspect of weather, but that those aspects do not show any trend over time (**Crick & Sparks 1999**).

The significance of the changes in phenology for breeding performance and productivity is currently unknown and needs to be investigated. Earlier average laying may be beneficial for birds because earlier fledging is often related to improved survival to the following year.[illegible] However, several studies are beginning to show that birds are unable to advance their phenology sufficiently to match phenological changes in their food supply, such that later nesting birds are suffering from poorer productivity.[illegible] Early nesting parents have an increased chance of having their offspring recruited into the next generation (**Visser *et al.* 1998**).[illegible] The conservation significance of factors such as these needs to be assessed urgently.

Table 4.5.4 Significant trends in laying date (Day 1 = 1 Jan) for 1968-2002

Species	Period (yrs)	Mean annual sample	Trend	Predicted in first year	Predicted in last year	Change	Comment
Magpie	34	38	Curvilinear	day 110	day 82	-28 days	
Grey Heron	34	30	Linear decline	day 98	day 72	-26 days	Non-breeders include
Long-tailed Tit	34	42	Curvilinear	day 109	day 94	-15 days	
Corn Bunting	34	14	Linear decline	day 180	day 165	-15 days	Small sample
Chiffchaff	34	39	Curvilinear	day 135	day 121	-14 days	
Greenfinch	34	94	Linear decline	day 145	day 132	-13 days	
Tree Pipit	34	19	Linear decline	day 146	day 135	-11 days	Small sample
Blackcap	34	35	Curvilinear	day 139	day 128	-11 days	
Nuthatch	34	26	Linear decline	day 122	day 112	-10 days	Small sample
Oystercatcher	34	45	Linear decline	day 138	day 129	-9 days	
Robin	34	116	Curvilinear	day 117	day 108	-9 days	
Redstart	34	63	Curvilinear	day 140	day 131	-9 days	
Carrion Crow	34	34	Curvilinear	day 106	day 97	-9 days	Includes Hooded Crow
House Sparrow	34	45	Linear decline	day 146	day 137	-9 days	
Chaffinch	34	108	Curvilinear	day 130	day 121	-9 days	
Ringed Plover	34	40	Linear decline	day 146	day 138	-8 days	
Swallow	34	87	Curvilinear	day 170	day 162	-8 days	
Meadow Pipit	34	41	Linear decline	day 138	day 130	-8 days	
Dipper	34	62	Linear decline	day 108	day 100	-8 days	
Ring Ouzel	34	26	Linear decline	day 135	day 127	-8 days	Small sample
Marsh Tit	34	13	Linear decline	day 118	day 110	-8 days	Small sample
Great Tit	34	113	Curvilinear	day 121	day 113	-8 days	
Treecreeper	34	14	Linear decline	day 127	day 120	-7 days	Small sample
Blue Tit	34	116	Linear decline	day 123	day 117	-6 days	
Reed Warbler	34	141	Curvilinear	day 167	day 162	-5 days	
Willow Warbler	34	86	Linear decline	day 140	day 135	-5 days	
Wren	34	88	Linear decline	day 134	day 130	-4 days	
Whinchat	34	31	Linear decline	day 150	day 146	-4 days	
Whitethroat	34	17	Curvilinear	day 146	day 143	-3 days	Small sample
Jackdaw	34	20	Curvilinear	day 113	day 110	-3 days	Small sample
Blackbird	34	113	Curvilinear	day 115	day 114	-1 days	
Lesser Redpoll	34	12	Curvilinear	day 147	day 147	0 days	Small sample
Skylark	34	20	Curvilinear	day 146	day 151	5 days	Small sample
Yellowhammer	34	26	Linear increase	day 150	day 157	7 days	Small sample

See **Help** for information on category meanings.

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4.6 Conclusion

We hope that this report will be useful both as a ready source of information for conservation practitioners and as a source of information for those involved in more strategic conservation policy making. The information presented here is very much the tip of the data iceberg held by the BTO, providing a concise overview of the way in which populations are changing and suggesting areas where further research and conservation action needs to be taken.

Alerts are raised as a result of declines in the population sizes of a considerable number of species. These declines will help conservation organisations to prioritise future conservation action, alongside the recently published Population Status of Birds list (**Gregory *et al.* 2002**) and other information.

The information concerning demographic factors contained in this report will also help conservation organisations to target their resources more effectively. For declining species of conservation importance, declines in breeding performance may indicate that conservation action should be targeted at the breeding season; the lack of a decline in breeding performance may suggest that factors other than nesting success, such as loss of habitat or changes in survival rates are more likely to be influencing observed population declines.

Finally, we hope that users of this report will provide feedback on how the report can be improved in the future. We welcome comments on more general aspects of this report as they will help us to produce a better and more useful product in the next edition.

Email your comments

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5. Acknowledgements

Volunteer fieldwork

Our biggest thankyou is to the volunteers who collected the data on which this website is based. The population trends and other results that we present rely on the sustained, long-term fieldwork of many thousands of BTO volunteers. Our knowledge of the conservation status of the UK's bird populations is only possible as a result of their dedication and enthusiasm. The conservation community owes them an enormous debt of gratitude for their work. We are also very grateful to the many farmers, land managers and landowners who allowed census work, nest recording and ringing to take place on their land.

Report production and analysis

This website presents the latest in a series of reports, prepared within the partnership between the British Trust for Ornithology (BTO) and the Joint Nature Conservation Committee (JNCC) (on behalf of Natural England, Scottish Natural Heritage, the Countryside Council for Wales and the Environment & Heritage Service of Northern Ireland), as part of its programme of research into nature conservation.

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Section 6 - References

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7. Appendix - Summary tables of changes in population size and breeding performance

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7.1 Tables of alerts and population increases from CBC/BBS

1a. Table of population alerts for CBC/BBS UK 1967-2002

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Corn Bunting	35	55	-87	-93	-79	>50	
Grey Partridge	35	106	-86	-91	-81	>50	
Spotted Flycatcher	35	111	-85	-90	-78	>50	
Turtle Dove	35	99	-77	-87	-65	>50	
Willow Tit	35	42	-77	-90	-60	>50	
Yellow Wagtail	35	61	-67	-86	-30	>50	
Whitethroat	35	340	-64	-75	-53	>50	
Marsh Tit	35	81	-63	-75	-49	>50	
Yellowhammer	35	355	-54	-64	-42	>50	
Bullfinch	35	230	-53	-62	-44	>50	
Song Thrush	35	516	-51	-58	-44	>50	
Dunnock	35	538	-38	-45	-28	>25	
Mistle Thrush	35	354	-36	-46	-21	>25	
Reed Bunting	35	156	-34	-49	-15	>25	

1b. Table of population alerts for CBC/BBS England 1967-2002

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Tree Sparrow	35	77	-97	-99	-94	>50	
Lesser Redpoll	35	41	-90	-97	-78	>50	
Grey Partridge	35	94	-87	-91	-84	>50	
Spotted Flycatcher	35	87	-85	-90	-78	>50	
Corn Bunting	35	53	-85	-94	-71	>50	
Tree Pipit	35	41	-80	-90	-64	>50	
Starling	35	380	-80	-86	-73	>50	

Willow Tit	35	39	-78	-88	-62	>50	
Turtle Dove	35	99	-77	-86	-65	>50	
Linnet	35	294	-68	-76	-60	>50	
Yellow Wagtail	35	60	-66	-83	-31	>50	
Whitethroat	35	297	-64	-74	-52	>50	
Marsh Tit	35	75	-62	-74	-46	>50	
Skylark	35	348	-60	-68	-52	>50	
Willow Warbler	35	346	-58	-70	-45	>50	
Cuckoo	35	226	-56	-68	-43	>50	
Yellowhammer	35	310	-54	-63	-43	>50	
Song Thrush	35	416	-53	-62	-46	>50	
Bullfinch	35	192	-52	-64	-41	>50	
Dunnock	35	450	-40	-49	-28	>25	
Meadow Pipit	35	101	-39	-73	-3	>25	
Mistle Thrush	35	295	-39	-49	-25	>25	
Reed Bunting	35	127	-38	-55	-13	>25	

2a. Table of population alerts for CBC/BBS UK 1977-2002

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Grey Partridge	25	118	-88	-91	-83	>50	
Corn Bunting	25	63	-88	-94	-81	>50	
Spotted Flycatcher	25	124	-81	-87	-74	>50	
Willow Tit	25	43	-80	-90	-63	>50	
Turtle Dove	25	112	-77	-87	-68	>50	
Yellow Wagtail	25	73	-66	-81	-42	>50	
Yellowhammer	25	443	-53	-61	-45	>50	
Bullfinch	25	270	-52	-61	-42	>50	
Lapwing	25	219	-51	-63	-37	>50	
Red-legged Partridge	25	155	-48	-65	-28	>25	
Reed Bunting	25	179	-48	-57	-37	>25	
Mistle Thrush	25	443	-37	-45	-26	>25	
Marsh Tit	25	91	-36	-51	-18	>25	
Song Thrush	25	646	-33	-43	-25	>25	
Dunnock	25	677	-30	-39	-22	>25	
Lesser Whitethroat	25	122	-27	-44	-1	>25	

2b. Table of population alerts for CBC/BBS England 1977-2002

Species	Period	Plots	Change	Lower	Upper	Alert	Comment

	(yrs)	(n)	(%)	limit	limit		
Lesser Redpoll	25	40	-97	-99	-94	>50	
Tree Sparrow	25	75	-96	-99	-93	>50	
Grey Partridge	25	105	-88	-92	-85	>50	
Corn Bunting	25	61	-88	-95	-78	>50	
Willow Tit	25	40	-82	-91	-70	>50	
Tree Pipit	25	44	-81	-89	-68	>50	
Spotted Flycatcher	25	96	-81	-86	-73	>50	
Turtle Dove	25	111	-78	-87	-68	>50	
Starling	25	491	-76	-81	-68	>50	
House Sparrow	25	377	-69	-77	-58	>50	
Yellow Wagtail	25	71	-64	-82	-36	>50	
Skylark	25	444	-61	-66	-56	>50	
Cuckoo	25	283	-56	-66	-46	>50	
Yellowhammer	25	387	-55	-61	-48	>50	
Linnet	25	365	-54	-63	-42	>50	
Willow Warbler	25	425	-53	-63	-41	>50	
Bullfinch	25	221	-53	-62	-42	>50	
Reed Bunting	25	143	-52	-64	-42	>50	
Red-legged Partridge	25	153	-49	-65	-29	>25	
Meadow Pipit	25	128	-46	-69	-28	>25	
Lapwing	25	178	-45	-63	-31	>25	
Mistle Thrush	25	367	-41	-47	-30	>25	
Song Thrush	25	515	-38	-47	-29	>25	
Marsh Tit	25	84	-34	-51	-15	>25	
Dunnock	25	564	-33	-43	-21	>25	
Lesser Whitethroat	25	117	-33	-49	-13	>25	
Kestrel	25	212	-31	-44	-11	>25	
Goldcrest	25	192	-29	-51	-9	>25	

3a. Table of population alerts for CBC/BBS UK 1992-2002

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Willow Tit	10	58	-60	-76	-41	>50	
Turtle Dove	10	181	-48	-58	-36	>25	
Corn Bunting	10	126	-45	-60	-30	>25	
Grey Partridge	10	205	-43	-52	-31	>25	
Spotted Flycatcher	10	190	-43	-54	-29	>25	
Yellow Wagtail	10	138	-38	-60	-27	>25	
Yellowhammer	10	890	-26	-32	-20	>25	

3b. Table of population alerts for CBC/BBS England 1992-2002

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Lesser Redpoll	10	42	-71	-90	-54	>50	
Willow Tit	10	52	-65	-75	-51	>50	
Tree Pipit	10	64	-55	-70	-35	>50	
Turtle Dove	10	179	-48	-59	-37	>25	
Cuckoo	10	544	-46	-51	-40	>25	
Starling	10	1047	-46	-50	-41	>25	
Corn Bunting	10	120	-43	-58	-19	>25	
Grey Partridge	10	181	-41	-54	-30	>25	
Yellow Wagtail	10	135	-39	-59	-23	>25	
Spotted Flycatcher	10	141	-38	-53	-22	>25	
Willow Warbler	10	800	-29	-35	-22	>25	
Yellowhammer	10	776	-27	-33	-21	>25	

4a. Table of population alerts for CBC/BBS UK 1997-2002

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Willow Tit	5	61	-42	-59	-17	>25	
Turtle Dove	5	222	-32	-40	-23	>25	
Grey Partridge	5	242	-27	-36	-18	>25	
Yellow Wagtail	5	165	-25	-37	-13	>25	
Spotted Flycatcher	5	231	-25	-34	-10	>25	

4b. Table of population alerts for CBC/BBS England 1997-2002

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Willow Tit	5	54	-46	-63	-31	>25	
Cuckoo	5	643	-34	-39	-30	>25	
Turtle Dove	5	219	-33	-39	-22	>25	
Willow Warbler	5	987	-29	-31	-25	>25	
Yellow Wagtail	5	160	-26	-40	-11	>25	

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Appendix 7.1 Tables 5a and 5b

7.1 Tables of alerts and population increases from CBC/BBS

5a. Table of population increases of >50% for UK CBC/BBS 1967-2002

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Great Tit	35	555	71	48	94		
Jackdaw	35	344	73	21	154		
Reed Warbler	35	43	89	27	260		
Pied Wagtail	35	300	97	48	170		
Wren	35	622	99	69	124		
Magpie	35	472	108	68	150		
Blackcap	35	391	121	79	191		
Woodpigeon	35	514	126	18	398		
Nuthatch	35	129	126	68	230		
Mallard	35	320	188	116	255		
Coot	35	73	230	127	692		
Great Spotted Woodpecker	35	230	230	146	446		
Mute Swan	35	59	247	49	646		
Buzzard	35	131	407	240	1287		

5b. Table of population increases of >50% for England CBC/BBS 1967-2002

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Jackdaw	35	274	63	13	173		
Reed Warbler	35	41	64	10	254		
Great Tit	35	463	66	44	92		
Pheasant	35	348	74	37	154		
Long-tailed Tit	35	238	79	25	152		
Wren	35	501	98	68	129		
Pied Wagtail	35	233	104	49	206		
Blackcap	35	347	110	72	156		
Carrion Crow	35	458	110	76	168		Includes Hooded Crow

Magpie	35	405	111	67	166		
Nuthatch	35	112	124	62	224		
Woodpigeon	35	415	137	17	399		
Stock Dove	35	191	188	105	385		
Green Woodpecker	35	188	188	119	292		
Mute Swan	35	50	201	32	571		
Mallard	35	270	210	142	283		
Great Spotted Woodpecker	35	208	227	141	399		
Coot	35	66	232	119	639		
Buzzard	35	75	352	203	977		

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Appendix 7.2

7.1 Tables of alerts and population increases from WBS

1. Table of alerts for WBS waterways 1977-2002

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Yellow Wagtail	25	21	-92	-98	-87	>50	
Little Grebe	25	17	-76	-88	-41	>50	Small sample
Reed Bunting	25	52	-63	-73	-46	>50	
Redshank	25	19	-47	-85	-14	>25	Small sample
Pied Wagtail	25	65	-41	-56	-29	>25	
Common Sandpiper	25	27	-29	-44	-15	>25	

2. Table of alerts for WBS waterways 1992-2002

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Yellow Wagtail	10	17	-79	-89	-66	>50	Small sample
Little Grebe	10	15	-49	-65	-30	>25	Small sample
Redshank	10	19	-39	-52	-23	>25	Small sample

3. Table of alerts for WBS waterways 1997-2002

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Yellow Wagtail	5	14	-65	-77	-51	>50	Small sample
Sand Martin	5	23	-43	-56	-25	>25	
Little Grebe	5	13	-42	-55	-29	>25	Small sample

4. Table of population increases for WBS waterways 1977-2002

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Mute Swan	25	44	59	10	121		
Oystercatcher	25	23	73	38	123		
Whitethroat	25	41	125	12	292		
Mallard	25	57	167	103	245		

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Appendix 7.3

7.1 Tables of alerts and population increases from CES

Table of alerts for CES adults 1984-2002

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Linnet	18	20	-94	.	.	[>50*]	
Lesser Redpoll	18	19	-74	.	.	[>50*]	Small sample
Willow Warbler	18	89	-60	.	.	[>50*]	
Spotted Flycatcher	18	16	-59	.	.	[>50]	Small sample
Lesser Whitethroat	18	41	-56	.	.	[>50*]	
Willow Tit	18	22	-53	.	.	[>50]	
Reed Bunting	18	59	-51	.	.	[>50*]	
Whitethroat	18	58	-34	.	.	[>25]	
Song Thrush	18	79	-26	.	.	[>25*]	

Table of alerts for CES adults 1992-2002

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Linnet	10	22	-82	.	.	[>50*]	
Lesser Whitethroat	10	44	-58	.	.	[>50]	
Willow Tit	10	22	-51	.	.	[>50]	
Lesser Redpoll	10	17	-51	.	.	[>50]	Small sample
Willow Warbler	10	101	-48	.	.	[>25*]	
Spotted Flycatcher	10	15	-42	.	.	[>25]	Small sample
Reed Bunting	10	70	-32	.	.	[>25]	
Sedge Warbler	10	77	-25	.	.	[>25*]	

Table of alerts for CES adults 1997-2002

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Linnet	5	17	-56	.	.	[>50*]	Small sample
Willow Warbler	5	96	-43	.	.	[>25*]	
Lesser Whitethroat	5	35	-34	.	.	[>25]	
Willow Tit	5	16	-33	.	.	[>25]	Small sample

Table of population increases for CES adults 1984-2002

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Wren	18	93	51	.	.		
Robin	18	88	54	.	.		
Greenfinch	18	41	54	.	.		
Chiffchaff	18	63	143	.	.		

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Appendix 7.4

7.1 Tables of population declines or increases from BBS

Table of declines >25% for BBS UK 1994-2003

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Wood Warbler	9	54	-68	-78	-55	(>50)	
Willow Tit	9	54	-55	-68	-37	(>50)	
Sand Martin	9	96	-46	-59	-29	(>25)	
Turtle Dove	9	184	-44	-53	-33	(>25)	
Pied Flycatcher	9	41	-43	-59	-20	(>25)	
Spotted Flycatcher	9	190	-42	-51	-31	(>25)	
Shelduck	9	114	-39	-49	-26	(>25)	
Grey Partridge	9	210	-39	-49	-27	(>25)	
Lesser Whitethroat	9	202	-39	-48	-27	(>25)	
Cuckoo	9	707	-36	-41	-30	(>25)	
Corn Bunting	9	139	-35	-45	-22	(>25)	
Siskin	9	112	-33	-46	-16	(>25)	
Tawny Owl	9	76	-32	-49	-10	(>25)	Nocturnal species
Great Crested Grebe	9	56	-28	-47	-1	(>25)	
Swift	9	852	-28	-34	-22	(>25)	
Starling	9	1469	-28	-33	-23	(>25)	
Curlew	9	429	-27	-33	-21	(>25)	

This table does not use formal alerts methods due to the small number of years of data.
Population changes are based on an annual population index with no smoothing or truncation of end points.

Table of declines >25% for BBS England 1994-2003

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Willow Tit	9	48	-62	-74	-45	(>50)	
Lesser Redpoll	9	47	-51	-67	-26	(>50)	
Cuckoo	9	572	-48	-53	-43	(>25)	
Turtle Dove	9	181	-44	-54	-33	(>25)	
Lesser Whitethroat	9	193	-39	-49	-27	(>25)	
Spotted Flycatcher	9	139	-38	-49	-24	(>25)	

Willow Warbler	9	823	-37	-41	-33	(>25)	
Starling	9	1210	-36	-40	-31	(>25)	
Great Crested Grebe	9	49	-33	-51	-7	(>25)	
Grey Partridge	9	184	-32	-43	-19	(>25)	
Corn Bunting	9	132	-31	-42	-18	(>25)	
Swift	9	737	-29	-35	-23	(>25)	
Sand Martin	9	64	-29	-47	-5	(>25)	
Tree Pipit	9	63	-26	-43	-4	(>25)	

This table does not use formal alerts methods due to the small number of years of data.
Population changes are based on an annual population index with no smoothing or truncation of end points.

Table of declines >25% for BBS Scotland 1994-2003

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Swift	9	40	-62	-74	-44	(>50)	
Lapwing	9	84	-42	-53	-28	(>25)	
Siskin	9	56	-40	-58	-16	(>25)	
Curlew	9	120	-36	-45	-25	(>25)	
Hooded Crow	9	50	-36	-53	-13	(>25)	

This table does not use formal alerts methods due to the small number of years of data.
Population changes are based on an annual population index with no smoothing or truncation of end points.

Table of declines >25% for BBS Wales 1994-2003

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Starling	9	78	-62	-72	-49	(>50)	
Cuckoo	9	54	-49	-63	-28	(>25)	
Tree Pipit	9	30	-45	-64	-15	(>25)	
Yellowhammer	9	37	-39	-56	-16	(>25)	
Mallard	9	53	-37	-54	-13	(>25)	
Willow Warbler	9	136	-34	-42	-25	(>25)	
Garden Warbler	9	51	-29	-48	-3	(>25)	
Bullfinch	9	49	-28	-48	-1	(>25)	
Coal Tit	9	60	-27	-45	-4	(>25)	

This table does not use formal alerts methods due to the small number of years of data.
Population changes are based on an annual population index with no smoothing or truncation of end points.

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Appendix 7.4 continued

7.4 Tables of population declines or increases from BBS

Table of population increases for BBS UK 1994-2003

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Tree Sparrow	9	133	52	24	85		
Buzzard	9	504	53	38	69		
Grey Wagtail	9	162	53	26	85		
Goldcrest	9	553	57	44	71		
Great Spotted Woodpecker	9	619	85	68	104		
Raven	9	173	99	65	141		
Coot	9	194	102	74	134		
Canada Goose	9	311	136	108	169		
Stonechat	9	88	168	100	258		
Greylag Goose	9	92	183	120	264		

This table does not use formal alerts methods due to the small number of years of data.
Population changes are based on an annual population index with no smoothing or truncation of end points.

Table of population increases for BBS England 1994-2003

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Goldcrest	9	380	51	36	68		
Buzzard	9	280	56	37	78		
Grey Wagtail	9	102	60	27	103		
Great Spotted Woodpecker	9	552	81	64	100		
Greylag Goose	9	73	100	60	150		
Coot	9	174	117	87	153		
Canada Goose	9	293	131	103	162		
Raven	9	50	220	130	344		
Stonechat	9	34	237	120	417		

This table does not use formal alerts methods due to the small number of years of data.
Population changes are based on an annual population index with no smoothing or truncation of end points.

Table of population increases for BBS Scotland 1994-2003

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Great Tit	9	106	52	23	88		
Rook	9	96	52	15	101		
Wren	9	176	56	36	80		
Magpie	9	33	59	13	124		
Blue Tit	9	120	64	38	95		
House Sparrow	9	72	65	33	105		
Whitethroat	9	54	66	20	130		
Buzzard	9	99	81	41	132		
Mistle Thrush	9	59	82	31	153		
Raven	9	38	85	19	186		
Goldfinch	9	61	104	43	191		
Grey Heron	9	41	110	38	218		Non-breeders included
Goldcrest	9	70	112	61	180		
House Martin	9	43	152	57	304		

This table does not use formal alerts methods due to the small number of years of data.
Population changes are based on an annual population index with no smoothing or truncation of end points.

Table of population increases for BBS Wales 1994-2003

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Nuthatch	9	54	57	13	118		
Great Spotted Woodpecker	9	47	63	14	133		
Blackcap	9	90	64	32	104		
House Sparrow	9	94	85	53	125		
Goldfinch	9	94	110	64	168		

This table does not use formal alerts methods due to the small number of years of data.
Population changes are based on an annual population index with no smoothing or truncation of end points.

Table of population increases for BBS N.Ireland 1994-2003

Species	Period (yrs)	Plots (n)	Change (%)	Lower limit	Upper limit	Alert	Comment
Chaffinch	9	63	58	19	109		
Wren	9	66	64	28	110		
Woodpigeon	9	58	66	25	120		
Blackbird	9	62	67	31	113		
Blue Tit	9	53	73	27	136		
Starling	9	54	76	16	167		
Coal Tit	9	42	128	32	296		
Hooded Crow	9	56	139	64	248		
Goldcrest	9	31	145	37	336		
Great Tit	9	47	145	65	265		
Greenfinch	9	33	175	52	397		

Dunnock	9	48	229	108	422		

This table does not use formal alerts methods due to the small number of years of data.
Population changes are based on an annual population index with no smoothing or truncation of end points.

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8. Select your own table of population changes (2004)

This page allows you to display a table of population changes according to a range of different criteria. The population change data that will be displayed are the same as those that are contained in the individual species accounts. You can choose which schemes and time periods will be included in your table. You can also select all species or a particular species. Just complete the form below and then click on the compile table button to display your chosen table

Select periods to be included (at least one)

- ☐ 5 years
- ☐ 10 years
- ☐ 25 years
- ☑ Maximum

Select scheme categories to be included (at least one)

- ☑ CBC\BBS United Kingdom
- ☐ CBC\BBS England
- ☐ Waterways
- ☐ Heronries United Kingdom
- ☐ Heronries England and Wales
- ☐ Heronries England
- ☐ Heronries Scotland
- ☐ Heronries Wales
- ☐ CES adults
- ☐ CES juveniles
- ☐ BBS United Kingdom
- ☐ BBS England
- ☐ BBS Wales
- ☐ BBS Scotland
- ☐ BBS Northern Ireland

Select species to be included. You may select either one individual species or all species.

All species
Little Grebe
Great Crested Grebe
Cormorant
Grey Heron
Grey Heron
Mute Swan
Greylag Goose
Canada Goose
Shelduck

All species
Little Grebe
Great Crested Grebe
Cormorant
Grey Heron
Grey Heron
Mute Swan
Greylag Goose
Canada Goose
Mallard

Sort table by:

- (•) Species; scheme; period (descending)
- ( ) Scheme; species; period (descending)
- ( ) Change (ascending)
- ( ) Scheme; change (ascending)

Compile table

Reset to default values

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Images: Yellow Wagtail, by Liz Cutting / BTO; Lapwing, by Sarah Kelman / BTO

Breeding Birds in the Wider Countryside: their conservation status 2004

This report is a "one-stop-shop" for information about the population status of our common terrestrial birds. With one page per species, readers can quickly find all the key information about trends in population size and breeding performance as measured by BTO monitoring schemes. It provides an overview of trends for the period 1966–2003.

This report is the third in a series, prepared within the Partnership between the British Trust for Ornithology (BTO) and the Joint Nature Conservation Committee (JNCC) (on behalf of Natural England, Scottish Natural Heritage, Countryside Council for Wales and the Environment & Heritage Service of Northern Ireland) as part of its programme of research into nature conservation.

It is the result of the sustained long-term fieldwork efforts of many thousands of the BTO's volunteer supporters. Without their enthusiasm for collecting these hard-won facts, the cause of conservation in the UK would be very much the poorer.

Baillie, S.R., Marchant, J.H., Crick, H.Q.P., Noble, D.G., Balmer, D.E., Beaven, L.P., Coombes, R.H., Downie, I.S., Freeman, S.N., Joys, A.C., Leech, D.I., Raven, M.J., Robinson, R.A. & Thewlis, R.M. 2004. Breeding Birds in the Wider Countryside: their conservation status 2004. *BTO Research Report* **385**, BTO, Thetford, UK.

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