



## WHAT'S HAPPENING TO OUR WOODLAND BIRDS?

### **Long-term changes in the populations of woodland birds.**

A re-survey of breeding bird populations of broadleaved and mixed woodlands in 2003/04 to examine changes since the 1960s, 1970s and 1980s and test these changes against a range of hypotheses for their causes.

### **Executive Summary**

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## Executive Summary

1. In recent years there has been growing concern about declines in woodland bird populations in the UK. The UK Government's Wildbird Populations Framework Indicator for woodland birds fell by over 20% between 1976 and 2001. In addition, a number of woodland breeding species were added to the red and amber lists of Birds of Conservation Concern because of population declines between 1974 and 1999. Bullfinch, lesser spotted woodpecker, marsh tit, song thrush, spotted flycatcher, tree pipit and willow tit all declined by more than 50% during this period, whilst dunnock, goldcrest, lesser redpoll, mistle thrush, willow warbler and wood warbler all declined by more than 25%.
2. These declines have been detected by the national monitoring schemes, which are based on data from all habitats in which the species are recorded, rather than specifically from woodlands. The trends may therefore not be representative of changes to bird populations in woodland *per se* whilst there are further concerns over whether the trends are biased to some regions and / or habitats.
3. This report presents the findings of a major four-year project, the Repeat Woodland Bird Survey (RWBS), which investigated trends in breeding bird populations in British broadleaved and mixed woods. Data were collected on both bird populations and habitat variables therefore allowing some of the proposed hypotheses for the changes in woodland bird numbers to be examined. This project represents the first attempt in the UK to link woodland bird population change to environmental data.
4. The project was funded by a consortium comprising Defra, English Nature, Forestry Commission England, Forestry Commission Scotland, Forestry Commission Wales, The Woodland Trust, the British Trust for Ornithology (BTO) and the Royal Society for the Protection of Birds (RSPB) and was carried out by the RSPB and BTO. The project was conducted over the period 2002 to 2005 with a budget of £609,000.
5. The main objectives of the project were: to investigate whether existing national monitoring has been reliable for birds within woodland; to look for evidence of gross habitat changes in woodland plots over the last two decades; to collect data on covariates that may help to explain the changes in woodland bird numbers; and to examine these data in relation to the major hypotheses proposed for the causes of woodland bird declines.
6. Additionally the project examined bird population changes in farm woodlands, Ancient Semi-Natural Woodlands (ASNW) and sites designated for nature conservation (e.g. Sites of Special Scientific Interest, SSSIs) relative to other woods.

7. Woodland plots were surveyed in 2003 and 2004, repeating the surveys first carried out in the same plots mainly in the 1980s but also, for a sample of sites, in the 1960s and 1970s. A total of 406 woodland sites were surveyed at least once – 253 woods by the RSPB using point count methods and 153 by the BTO using territory mapping methods. All were broadleaved or mixed woodland. The RSPB and BTO datasets were complementary giving wide geographic coverage of England, Wales and Scotland.
8. Habitat data and covariates, such as the evidence of deer browsing and grey squirrel drey counts, were collected for all plots using standardised methods. Remote sensed data have been used to examine potential effects of landscape context on the changes in bird numbers in individual woods. Although desirable, the collection of invertebrate data was beyond the scope of this study.
9. By making use of the large quantities of data collected in the 1980s and earlier, this project has been a powerful exploration of woodland bird changes and their possible causes. However, the original woodland surveys were carried out for a variety of purposes and, although the sites may be broadly representative of broadleaved and mixed woodland, they are not a random sample. Potential biases that this may have introduced are fully discussed in the report.

#### **10. Changes in bird numbers**

- Eight out of a total of 34 species, with sufficient data to permit analysis, showed large national declines (>25%) according to both RSPB and BTO datasets: garden warbler, lesser redpoll, lesser spotted woodpecker, spotted flycatcher, tree pipit, willow tit, willow warbler and wood warbler. Additionally, hawfinch showed a large decline based on the data from the RSPB survey sites and a moderate (<25%) decline according to the BTO results although the latter was based on a small number of territories.
- Eleven out of the 34 species showed large national increases (>25%) in both datasets: blackcap, blue tit, chiffchaff, coal tit, great spotted woodpecker, great tit, green woodpecker, goldcrest, robin, treecreeper and wren.
- Estimated changes from the RWBS were compared with those from the long-term national monitoring schemes using the Woodland Common Birds Census (CBC) index (specific to woodland but only available up to 1999) and the combined CBC/Breeding Bird Survey (CBC/BBS) index (not specific to woodland but available up to 2004). The large declines detected by the national monitoring schemes for seven species (lesser spotted woodpecker, lesser redpoll, spotted flycatcher, tree pipit, willow tit, willow warbler and wood warbler) were all confirmed by the RWBS, whereas the national declines of three species (bullfinch, marsh tit and mistle thrush) were not supported by the RWBS data. Conversely, the declines detected by the RWBS for garden warbler, pied flycatcher and redstart had not been reported by the national monitoring schemes. Most of the

increases measured by the national monitoring schemes were confirmed by the RWBS e.g. for blackcap and chiffchaff and several resident passerines. However, the large increases detected by the RWBS for coal tit, goldcrest, great tit and treecreeper had not been found by the national monitoring schemes.

- Overall, more species breeding in woodland have increased than decreased. However, patterns of population change differ across groups of species. All long-distance migrants have declined whereas the two medium-distance migrants, blackcap and chiffchaff, have increased. Common species (such as blue tit and great spotted woodpecker) have tended to fare better than less common ones (such as willow tit and lesser spotted woodpecker).
- The regional patterns of change are complex. Both garden warbler and willow warbler have increased in Scotland but declined elsewhere and both blackcap and chiffchaff appear to be increasing less in the south and east. Both the RSPB and BTO data show a striking increase of spotted flycatchers in the southwest of England against overwhelming declines elsewhere.
- Although not strictly a woodland bird, the starling, which was an abundant breeding species in the RSPB and BTO sites in the 1980s, was virtually absent in 2003-04. No formal analyses were possible because it was found at too few sites in 2003-04. The decline of starlings is thought to be the result of the intensification of management practices on agricultural land.

#### **11. Bird population changes in farm woods, ASNW and designated sites**

- There was no evidence that bird populations in farm woods (woods <10ha and surrounded by farmland) fared worse than those in other woods. It should be noted, however, that the sample of woods may not be representative of the size distribution of farm woods in the wider countryside and, in particular, the number of woods <2 ha was small.
- Only four species showed a difference in population change between Ancient Semi-Natural Woodland (ASNW) and other woods: redstart and dunnock were more likely to have increased or be stable at ASNW sites whereas treecreeper and chiffchaff were more likely to have declined at these sites.
- Population changes at SSSIs and NNRs were compared with those at non-designated sites. Only nuthatch showed a difference, having increased less on designated sites.

#### **12. Changes in woodland habitat between the 1980s and 2003/04**

- Measurements of habitat made by the RSPB at a large sample of sites covered in the 1980s and in 2003/04 were used to assess how woodland habitat had changed over that period. Information is presented for a wide range of variables, both nationally and for individual localities (areas or counties containing clusters of sites e.g. New Forest, Forest of Dean, Buckinghamshire).

- In terms of vegetation structure, there was an overall tendency for there to be increases in sub-canopy vegetation cover (2-10m) and in canopy height and in low vegetation cover (below 2m). However, consistent patterns of change in the composition of the field layer were not evident, although there was some indication that distinct shifts occurred within localities.
- Dead wood resources had increased within the woods. The numbers of dead trees increased overall. Large dead limbs on live trees also generally increased and dead wood on the ground increased, both overall and across most localities.
- An important feature of the analyses of habitat change was that many variables showed strikingly inconsistent changes between localities. This may be indicative of different processes operating in different regions. Examples include low vegetation cover (<2m), herb cover, bramble cover and number of dead trees.

### **13. Correlates of bird population changes with 2003-04 habitat data**

- Changes in bird numbers between the 1980s and 2003/04 were modelled in relation to a wide range of environmental variables, all measured in 2003/04, thus comparing bird changes with a single snap shot of the current factors acting within a wood. The environmental variables included habitat, deer activity, surrounding landscape composition, spring climate change (1980-1999) and squirrel drey density.
- Numerous complex relationships were identified between changes in birds and environmental variables; the relationships for 18 declining species (ones showing negative trends in either the BTO or RSPB RWBS datasets) were reviewed in relation to various hypotheses that have been advanced to explain recent declines in woodland birds.
- Based on the data available, changes in woodland structure were thought to be the most likely driver for many of the bird declines. Potential causes of these structural changes include increases in woodland age, reduction in active management, and possibly increased deer browsing.
- Relationships with variables that are indicative of stand condition, such as canopy cover and number of dead trees, suggested that this factor is unlikely to be important in explaining declines.
- Hawfinch and lesser spotted woodpecker both decreased more heavily in woods with relatively high numbers of grey squirrel dreys but there was no other evidence that squirrel drey density was a significant factor.
- There were few relationships between declines in bird populations and spring climate variables.
- There were no relationships between declining species and standing dead trees or fallen dead wood. However, two species – wood warbler and redstart – tended to decrease more in woods with fewer dead limbs on trees. This may suggest that changes in dead wood could be important for these two species or that dead limbs could be a surrogate for other changes in habitat.

- A large number of species, for instance garden warbler, pied flycatcher, nuthatch and lesser redpoll, showed positive association with presence of lichens. Given the diverse ecological needs of the species involved, it seems unlikely that there is a direct causal link although the presence of lichens may relate to another, unmeasured, driver of change in bird populations.

#### **14. Correlates of bird population changes using habitat change data**

- For the RSPB survey sites covered in the mid 1980s and the early 2000s, it was possible to relate changes in bird populations directly to changes in habitat over that time interval.
- There were many correlations of bird population changes with measures of change in woodland structure. Grouping relationships of declining species according to the predictions from the proposed hypotheses, we found reasonable support for the following: i) change in age structure; ii) factors altering the structure of low vegetation.
- Support for the above hypotheses came largely from negative relationships of a number of declining species with increases in maximum tree height, basal area and canopy cover and positive relationships with increases in 0-0.5m and 2m cover and bramble cover.
- In general, changes in the other habitat variables (field layer variables, canopy cover, dead wood variables, tree height and water features) were not consistently correlated with bird population changes.

#### **15. Woodland bird monitoring**

- The effectiveness of existing national schemes for monitoring woodland birds is reviewed in the light of current poor representation of certain scarce woodland species.
- It is recommended that an extension to the existing core BTO/JNCC/RSPB Breeding Bird Survey monitoring scheme be developed to provide additional coverage of woodlands in Scotland and Wales.

#### **16. Summary and recommendations for further work**

- The RWBS has confirmed the trends in woodland birds detected by national monitoring schemes and provided a valuable focus on the most likely hypotheses or combinations of hypotheses for the declines of a number of species. It has also highlighted the hypotheses that are currently not supported by our data.
- This analysis supports the hypothesis that long-distance migrants may be under particular pressure, possibly as a consequence of problems in their winter range or on migration. However, the possibility that long-distance migrants are

experiencing problems on the breeding grounds, either as a result of habitat change or through competition with residents, should not be discounted. Other strong hypotheses emerging from these analyses are that several declining bird species have been affected by changes in woodland structure, possibly arising from changes in the age structure of woodland stands, changes to woodland management (especially a reduction in active management) and intensified pressure from deer. The study has generated the first quantitative evidence that the local distribution of the hawfinch in Britain may be affected by grey squirrel numbers.

- Recommendations are made for key areas of further research. These should seek to build on the findings of this correlative study to understand the processes leading to the declines of long distance migrants and the relationships between birds and the physical architecture of woodlands. It may also be valuable to make further efforts to understand the factors underlying the population increases shown by some species. For instance, the possible role of climate change as a driver of these increases requires further study, as does their consequences for other species. Suggestions are made for further analyses of these data, autecological studies of particular key species and studies of underlying processes. These will be necessary before remedial measures can be identified and trialed.
- This project has identified factors correlated with changes in abundance of species across individual woodland sites. However, it is possible that wide-scale factors not thoroughly addressed in this study could be responsible for reducing the national abundance of some species. The associations with local conditions could then become apparent through density-dependent changes in habitat occupancy even though they themselves may not be the primary drivers of the declines.
- It is concluded that there is no over-arching hypothesis to explain the declines of bird populations in British woodland and that a range of factors may operate in a species- and / or region-specific manner, and that interactions between factors may be critical.

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