BBS

The Breeding Bird Survey 2017 *incorporating the Waterways Breeding Bird Survey*

The population trends of the UK's breeding birds

BTO Looking out for birds

JNCC

rspb giving nature a home

THE 2017 BBS REPORT

THE BBS PARTNERSHIP

The BTO/JNCC/RSPB Breeding Bird Survey is a partnership jointly funded by the BTO, RSPB and JNCC, with fieldwork conducted by volunteers. The Breeding Bird Survey (BBS) now incorporates the Waterways Breeding Bird Survey (WBBS).

The members of the BBS Steering Committee in 2017 were James Pearce-Higgins (Chair, BTO), Deborah Procter (JNCC), Mark Eaton (RSPB), David Noble (BTO), Simon Gillings (BTO) and Dawn Balmer (BTO).

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THE BBS TEAM AT THE BTO

Sarah Harris is the BBS National Organiser and first point of contact for BBS or WBBS queries. Sarah is responsible for the day-to-day running of these surveys, liaising with BTO Regional Organisers and volunteers, maintaining the databases, promoting the schemes, and producing the annual report.

Dario Massimino, Research Ecologist in the Population Ecology and Modelling Team, worked on the bird population and mammal trends for 2017. David Noble is the Principal Ecologist for Monitoring, responsible for strategic developments in biodiversity monitoring. Dawn Balmer is Head of Surveys, which includes both BBS and WBBS, among other surveys. Maria Knight, Secretary in the Science Department works closely with Sarah assisting with the running of the surveys. Simon Gillings oversees the BBS research programme, and James Pearce-Higgins is the Director of Science.

Contact the BBS National Organiser:

Sarah Harris, British Trust for Ornithology
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ONLINE RESOURCES...

Further information, including population trend graphs, can be found at www.bto.org/bbs, and a full species-by-species discussion of these results, and those from other surveys, can be found on the BirdTrends website at www.bto.org/birdtrends.

This report can be downloaded from www.bto.org/bbs-report.

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The founder sponsors of the 1998 WBBS pilot year were Thames Water, British Waterways, Severn Trent, Hyder (Welsh Water) and Anglian Water. Since then surveys have been funded by the Environment Agency and BTO, and sponsored by Severn Trent, Anglian Water and by Essex & Suffolk Water.

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COVER IMAGE – CORN BUNTING: CHRIS KNIGHTS

INSIDE...

This is the twenty-third annual report of the BTO/JNCC/RSPB Breeding Bird Survey (BBS), containing the population trends of widespread UK breeding bird species during the period 1994–2017.

The BBS is the main scheme for monitoring the population changes of the UK's common breeding birds, providing an important indicator of the health of the countryside. BBS trends are produced each year for over 110 species, and the results are used widely to set priorities and inform conservation action.

The Breeding Bird Survey Partnership adopted the Waterways Breeding Bird Survey in 2017, previously funded by BTO with financial support from the Environment Agency, and this report now incorporates news, trends and research from this waterways-specific monitoring scheme.

Now including shorter-term trends, including trends for additional species, such as Marsh Harrier and Cetti's Warbler.

MARSH HARRIER: SARAH KELMAN

CITATION

Harris, S.J., Massimino, D., Gillings, S., Eaton, M.A., Noble, D.G., Balmer, D.E., Procter, D., Pearce-Higgins, J.W. & Woodcock, P. 2018. *The Breeding Bird Survey 2017.* BTO Research Report 706 British Trust for Ornithology, Thetford.

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Another BBS year, another record year for coverage...

News from the 2017 season: the first year of the Upland Rover scheme, the importance of BBS in UK bird monitoring, how the Wider Countryside Butterfly Survey can benefit nature conservation, online resources and NEW five- and 10-year trends!

By **Sarah Harris**, BBS National Organiser, BTO, and **Andrew Stanbury**, Conservation Scientist, RSPB

The BBS hit *another* UK coverage record in 2017 (pages 6–7); not only this, the pilot Upland Rovers scheme went very well and is continuing in 2018! The support from volunteers is really shining through; check out some volunteer experiences on Twitter at @BBS_birds or by searching the hashtag #_BBS. We are so grateful to all who contributed in 2017.

COVERAGE IS REMOTE

For the first time, 2017 saw a selection of carefully chosen BBS squares advertised as available for 'one-off' surveys, on account of their remote and rarely covered status. Although analyses of trends take into account geographical differences in coverage, this does still require some data from these remote, usually upland, areas on which to calculate this. It was a difficult decision to make, but for these areas it was decided that data collected infrequently and on only one visit would be much better than none. It should be stressed however, that all core BBS squares need to continue to be surveyed twice a year to maintain the gold standard in data quality currently achieved by the BBS. In 2017, 48 'Upland Rover' squares were surveyed, and seven of these were covered twice. Some were even taken on permanently by volunteers and reverted back to being 'core' BBS squares. More information on this can be found at: **www.bto.org/upland-rovers**.

The surveying of 'Upland Adjacent' squares, whereby a second square can be 'bolted' to a core square, continues and 100 Upland Adjacent squares were surveyed in 2017. Only certain, upland-type, BBS squares are eligible to have an Upland Adjacent square attached, contact **bbs@bto.org** for more information.

AVIFAUNAL REPRESENTATION

How much of the birdlife at a location does BBS monitor? Figure 1 shows the number of species for which UK BBS trends are available, as a percentage of all breeding species in each 10-km square, calculated using data from the *Bird Atlas 2007–11*. In many areas over 90% of the avifauna is represented by BBS trends. Species missing from the BBS UK trends are typically scarce, localised, hard to detect, or centred in areas of low BBS coverage. Gaps in this map are where such species co-occur (*e.g.* in north-west Scotland). Many of these species are monitored by other approaches, such as the Rare Breeding Birds Panel or periodic species-specific surveys.

As BBS coverage increases and some species expand in range, this map could turn a darker shade of red as it becomes possible to calculate population trends for even more species!

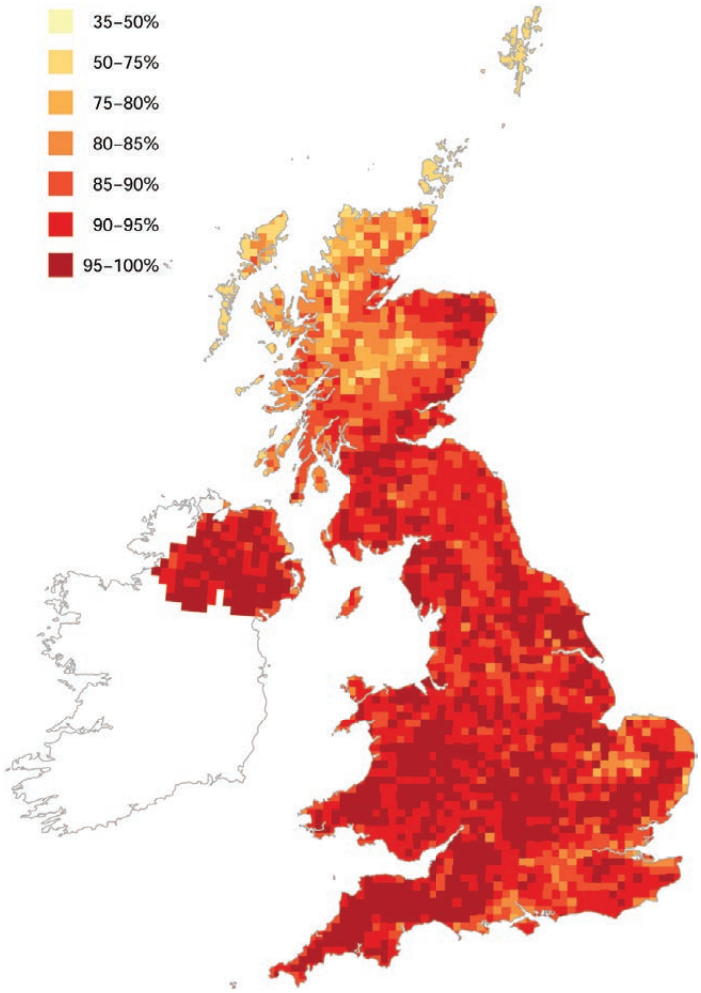


Figure 1 The percentage of species breeding in a 10-km square for which UK-level population trends are available from BBS.

MAP: SIMON GILLINGS

▲ Data from the Wider Countryside Butterfly Survey allow the trends and abundance of different taxonomic groups to be compared.

MORE THAN BIRDS: WCBS

Information collected by BBS volunteers has shown that the UK Whinchat population has declined by 53% since 1994. Over recent decades, the species has been lost from much of the lowlands and continues to decline in the uplands. Many factors, including suitability of breeding and wintering habitat, food supply, climate change and threats along migration routes, may be at play. Over the last three years, the RSPB has been carrying out research to investigate whether the Whinchat decline is linked to changes in breeding habitat. To do this, RSPB has been carrying out detailed studies within upland BBS squares that show differing Whinchat trends. What's this got to do with the Wider Countryside Butterfly Survey (WCBS)?

One of the benefits of BBS is that trends can be linked to information collected on habitat and mammals. Since 2007, BBS volunteers have also had the opportunity to take part in the WCBS. Not only does this provide invaluable data that allow Butterfly Conservation, BTO, the Centre for Ecology and Hydrology and JNCC to create robust UK butterfly trends, but they also allow the trends and abundance of different taxonomic groups to be compared; for example, are there correlations between butterfly and insectivorous bird trends in the same geographical area?

For Whinchat, RSPB is hoping to explore whether they are being retained in areas that generally have a greater abundance of invertebrates. As part of this, we will be contacting some BBS volunteers in the uplands this year to see if they would be interested in helping out and taking part in the WCBS.

TAKE PART IN THE WCBS

Anyone taking part in the BBS is invited to participate in the Wider Countryside Butterfly Survey. In recent years, participation by BBS volunteers in the WCBS has been declining. In 2017, 37% of all WCBS squares surveyed were by BBS volunteers on BBS squares; back in 2010 this figure was 47%. The number of squares covered in the WCBS as a whole has remained relatively stable. BBS contributions are really important so the aim is to get back up to the 2010 level, at least. A full review of the 2017 season, along with results and a butterfly ID feature can be found online, see 'Find out more'.

The WCBS requires a minimum of two additional visits to the BBS square during June to August in order to walk the same routes and record the butterflies, moths and dragonflies seen. These surveys are carried out at a more reasonable hour than those for birds; between 10:45 and 15:45. The survey needs to take place on days when butterfly activity is highest; calm, dry days, ideally with sunshine too – what's not to like? For BBS volunteers wishing to take part, visit the WCBS webpage at **www.bto.org/butterflies**.

FIND OUT MORE...

Follow **@BBS_birds** on Twitter

The following **video tutorials** are available at www.bto.org/bbs-online:

- **Entering data**; to be entered by the end of August
- **Mapping routes**; vital for consistency of future surveys on the square and are used in various research projects
- **Editing data**; from the current calendar year

The **Wider Countryside Butterfly Survey Annual Newsletter 2017 Season** and the **UKBMS report** are available online at www.bto.org/volunteer-surveys/bbs/bbs-publications/other reports

New five- and 10-year bird trends are now calculated for BBS (see pages 14–25) and WBBS (see pages 34–35) where sample size allows. Full tables including all trends, sample sizes and confidence intervals can be found online, links to which are provided throughout this report.

SMALL COPPER: JOHN FLOWERDAY, WHINCHAT: EDMUND FELLOWES

Sightings and coverage in 2017

RECORD BREAKING! 3,941 squares were surveyed in 2017

Up from 3,845 to 3,941, the BBS hit an all-time coverage high in 2017! The increase of 96 squares, bolstered by the 48 Upland Rover squares surveyed, includes a welcome increase in target areas; the under-represented habitats in remote areas. This is something everyone involved in the survey should be very proud of; thanks to all 2,814 volunteers involved.

▲ Stood 80 metres away in a bit of woodland scrub in a village, a lucky BBS surveyor heard this not so common Common Rosefinch before deviating ever so slightly from the transect route to watch the bird singing away! Detection type: song!

BBS IN NUMBERS

Of the 227 bird species recorded during the BBS in 2017, 22 species were seen just once; including scarcities such as Common Rosefinch, Red-rumped Swallow and Little Stint. At the other end of the spectrum, Wren was recorded on 94% of all BBS squares surveyed, Woodpigeon on 92% and Blackbird on 91%. Species such as Wood Warbler and Pied Flycatcher were seen on less than 2% of BBS squares covered in 2017, Willow Tit and Turtle Dove on less than 1%. For how long will these declining species reach the sample size required for BBS to be able to report robust trends?

Given the variety of habitat types covered, it isn't too surprising that 57 squares recorded five or fewer species in 2017. Nine squares, ranging from Lothian to Hampshire, recorded over 60 species during the two bird counts, the highest being, as in 2016, from a BBS square on the banks of the River Mersey, with 75 species recorded. All squares surveyed are equally important, whether with one species or 75 recorded. The UK is a varied place and the greater the coverage, the better our trends can encompass this variation.

OTHER SURVEY NEWS

In order to better understand the implications of differences in detectability, the recording of detection type (whereby it is noted whether a bird is first detected by song, call or visually), was first introduced in 2014. Participation continues to grow with 79% of squares recording this information in 2017. Colony data were recorded on 13% of squares, recording 21 colony nesting species, and data from 96% of squares was submitted online.

Table 1 Number of BBS squares surveyed

	England	Scotland	Wales	Northern Ireland	Channel Islands	Isle of Man	UK total
1994	1,173	245	122	25	1	4	1,570
1995	1,325	283	121	17	1	4	1,751
1996	1,420	308	116	65	7	4	1,920
1997	1,657	313	138	75	6	6	2,195
1998	1,713	309	192	85	7	6	2,312
1999	1,792	275	223	95	7	5	2,397
2000	1,749	246	213	83	7	3	2,301
2001*	533	78	22		7		640
2002	1,652	231	215	97	7	3	2,205
2003	1,739	255	214	109	7	4	2,328
2004	1,886	274	254	102	11	6	2,533
2005	2,181	305	271	120	13	3	2,893
2006	2,573	336	272	108	19	5	3,313
2007	2,822	517	269	131	16	4	3,759
2008	2,556	436	242	121	15	1	3,371
2009	2,570	431	235	116	17		3,369
2010	2,568	331	247	115	16		3,277
2011	2,539	359	224	110	15		3,247
2012	2,670	383	274	117	21	4	3,469
2013	2,730	473	331	127	26		3,687
2014	2,735	482	339	120	27		3,703
2015	2,827	476	341	78	23	3	3,748
2016	2,870	490	333	126	24	2	3,845
2017	2,926	519	337	128	28	3	3,941

*2001 – foot-and-mouth disease

COMMON ROSEFINCH: MARK THOMAS

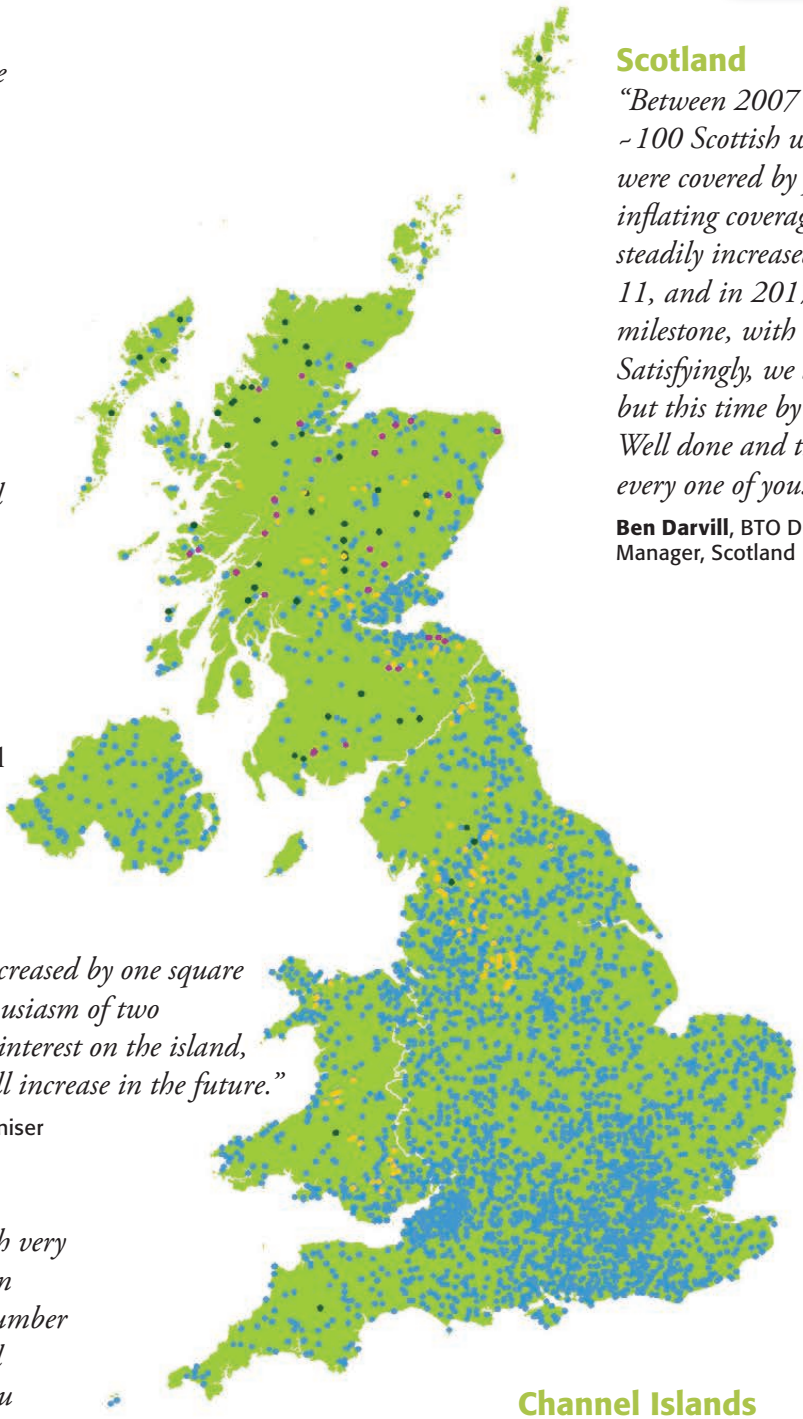
COVERAGE OVERVIEW

This map illustrates square distribution including the 'core' BBS squares, 'bolt-on' Upland Adjacent squares, squares introduced to the survey as Scottish Woodland Squares and continued as 'core' squares today, and the Upland Rovers squares; a development introduced in 2017 as a pilot and, due to an encouraging start, will continue into 2018.

Squares from the Upland BBS, covered in the past by professional fieldworkers, are not shown on this map nor in Table 1 on page 6, but data from these squares are included in the data analysis and trend calculations for the years they were surveyed. Please see *'Backgrounds and Methods'* on page 26 for more information on these surveys.

MAP KEY

- Core BBS
- Upland Adjacent
- Scottish Woodland
- Upland Rovers



Northern Ireland

"Northern Ireland's increase to 128 BBS squares in 2017 is through increased volunteer effort. This is fantastic, and gets us very close to the all-time record of 131 squares set in 2007. Perhaps we can beat this in 2018? Every single square surveyed in Northern Ireland is really important, so we are all making a vital contribution. Keep it up! Thanks."

Shane Wolsey, BTO Northern Ireland Officer

Fifty-two of the 128 squares covered in Northern Ireland were surveyed by professional fieldworkers, funded by the Northern Ireland Environment Agency.

Isle of Man

"BBS on the Isle of Man increased by one square in 2017, thanks to the enthusiasm of two individuals. With growing interest on the island, it is hoped participation will increase in the future."

Sarah Harris, BBS National Organiser

Wales

"Parts of Wales suffered with very unseasonable wet weather in June, but despite this the number of squares covered remained consistent. A huge thank you to all the volunteers who really pulled the stops out to keep the momentum behind the growth over past few years going."

Kelvin Jones, BTO Cymru Development Officer, Wales

Scotland

"Between 2007 and 2009 an additional ~100 Scottish woodland BBS squares were covered by professional fieldworkers, inflating coverage totals. Participation has steadily increased since Bird Atlas 2007–11, and in 2017 we reached a notable milestone, with over 500 squares covered. Satisfyingly, we also beat the 2007 total, but this time by volunteer power alone! Well done and thank you to each and every one of you!"

Ben Darvill, BTO Development and Engagement Manager, Scotland

England

"BBS coverage in England increased yet again in 2017, and is now within touching distance of an incredible 3,000 squares. Thanks to all involved.

It is worth noting, however, that although surveying in England contributes 74% of all BBS squares, England has 84% of the UK's population – come on, we can do more!"

Mark Eaton, RSPB Principal Conservation Scientist

Channel Islands

"An all-time coverage high for the Channel Islands with 28 squares covered, a fantastic achievement for all involved!"

Sarah Harris, BBS National Organiser

Farmland birds and farm landscapes

The latest news on the effectiveness of Agri-environment Schemes, checking up on progress to date and moving forwards post-Brexit.

By **Gavin Siriwardena**, Head of Terrestrial Ecology and Principal Ecologist, BTO

The BBS provides the most widespread, structured and standardised monitoring of any aspect of the British countryside. It is the envy of people with interests in other aspects of the environment, such as other wildlife, water quality or landscape character. Moreover, farmland is a major part of the countryside, so the ongoing declines in iconic species like Skylark, Lapwing, Yellowhammer and Grey Partridge, calculated from Common Birds Census and, subsequently, BBS data, indicate huge problems for the health of the environment.

▲ Iconic species monitored by the BBS are declining despite AES management: Lapwing by 42%, Skylark by 20% and Grey Partridge by 60% in the UK between 1995 and 2016.

THINKING BIG

Analyses of BBS bird and habitat data have confirmed that farmland birds most prefer farm landscapes, and that numbers are far more sensitive to landscape type than to habitat features like hedgerow structure and crop type that are more easily manipulated by management. Some of this may sound trivial, but is important because it shows that solutions need to lie in farmland: these are not species that can be protected and have their population trends reversed via isolated "natural habitat" in reserves. Rather, broad improvements in habitat quality across the landscape are needed. These are likely to be difficult to achieve, underlining how enormous the challenge to reverse declines is.

Agri-environment schemes (AES) that redirect Common Agricultural Policy subsidy funds to support environmental actions have provided the main tools for countryside conservation in recent decades. They include a range of interventions targeting priority birds and usually have a landscape-scale focus, so match the scale of BBS well. BTO and RSPB research projects, funded by Natural England (NE) and the Welsh Government, have exploited this to evaluate the performance of the Environmental Stewardship and Tir Gofal schemes.

A HELPING HAND

Measures aiming to benefit birds fall into two broad categories: those targeting breeding and wintering habitat. Breeding habitat options generally aim to increase nesting opportunities and/or invertebrate abundance and include hedgerow management, the six-metre grass field margin buffers that are now a common feature of arable farmland, and bespoke interventions like fallow patches for ground-nesting Skylarks and Lapwings. Winter options focus on enhancing seed food resources for resident granivores, via retaining weedy (unsprayed) stubble fields and planting sacrificial seed crops.

The strongest tests of these relationships have related changes in abundance of target species in BBS squares to the quantity of relevant interventions in or around the same squares. These show that interventions targeting

LAPWING: ALLAN DREWITT, SKYLARK & GREY PARTRIDGE: JILL PAKENHAM

Yellowhammer has declined by 18% in the UK between 1995 and 2016.

YELLOWHAMMER: AMY LEWIS

overwinter food supplies have the most positive effects, probably because they have addressed the factors that limit population size. Breeding season options had far fewer positive effects, but with exceptions that suggest effects at least on some local populations, or adding to the effects of winter interventions.

Interestingly, the effects of sacrificial seed crops for birds may have become weaker over time, while stubble management effects have become clearer. One explanation is that stubble fields have been a feature of farmland for centuries, so the entire natural community is adapted to them and can respond. Strips of seed crops along field boundaries, conversely, present a new habitat context, which mobile organisms need to learn to recognize in terms of the resources that they provide and sedentary ones need to colonize. Target birds may have responded most quickly, with other organisms following after a time lag. Hence, competitors like deer, predators like Sparrowhawk and disease organisms like Salmonella could have reduced net positive effects over time. We are working on testing this hypothesis now.

CHECKING UP AND MOVING ON

Recent NE-funded studies of farm-level responses of birds to Higher-Level Stewardship (HLS) by RSPB have also used BBS data. These analyses have shown that 12 of 17 priority species showed more positive changes in abundance on AES farms than elsewhere in at least one region, with changes in the countryside being assessed via carefully selected BBS squares. Half of the responses have been sustained over time and half seem to have been more temporary. The latter may reflect sensitivity to weather conditions in how well key management options, such as seed crops, perform, or that effectiveness diminishes over time, perhaps as habitat available is saturated as local populations increase. Either way, repeat surveys and analysis are needed.

Understanding both farm-level and large-scale responses of birds to AESs is critical to guide future scheme design. Hence, both updated national BBS analyses and evaluation of 2017 HLS farm-level results are in progress. The future of AESs and the overall subsidy structure after Brexit are currently hugely uncertain, but the farmland conservation problem remains. We have good evidence that certain interventions work well and that the mechanism of societal financial support for farmers to deliver environmental benefits can succeed, if applied appropriately. New policy mechanisms will be needed, but the possibilities for interventions and the need to monitor and to evaluate their effects will remain. BBS can, and should, be important in assessing the consequences nationally.

FIND OUT MORE...

Baker, D.J., Freeman, S.N., Grice, P.V. & Siriwardena, G.M. 2012. Landscape-scale responses of birds to agri-environment management: a test of the English Environmental Stewardship scheme. ***Journal of Applied Ecology*** 49(4), 871–882.

Walker, L.K., Morris, A.J., Cristinacce, A., Dadam, D., Grice, P. V. & Peach, W. J. 2018. Effects of higher-tier agri-environment scheme on the abundance of priority farmland birds. ***Animal Conservation*** doi:10.1111/acv.12386.

Corn Bunting research and conservation in the UK

BBS trend data are used to prioritise Corn Bunting research.

By **Rosemary Setchfield**, Conservation Scientist, RSPB, **Allan Perkins**, Senior Conservation Scientist, RSPB, and **Phil Grice**, Senior Ornithologist, Natural England

BBS trend data have proved a powerful tool for identifying Corn Bunting as a priority species for conservation, and for generating applied research in the UK. During the past 10 years this research has revealed important demographic constraints, informed new solutions and demonstrated that tailored advice to farmers deploying agri-enviromental management can bring about population increases.

CONSERVATION STATUS

The Corn Bunting is a farmland specialist of national priority for both government and non-governmental conservation bodies, including the RSPB, NE and Scottish Natural Heritage (SNH). This is largely because BBS trend data provide conclusive evidence of a major decline in abundance, while successive breeding bird atlases show an ongoing range contraction (Figure 2). As a consequence, the Corn Bunting appears on the 'Red' (high concern) List of Birds of Conservation Concern 4 (BoCC4) in the UK, is on the Section 41 list of priority species in England, and is listed as a 2020 route map species in the '2020 Challenge for Scotland's Biodiversity' strategy.

Corn Buntings are non-migratory in the UK, thus conservation solutions must address their year-round ecological requirements. Habitat associations vary regionally, linked to regional farmland characteristics.

Cereal crops are the dominant nesting habitat in arable farmland, whilst grass crops are also selected at mixed farmland sites. Agri-environment schemes (AES) are the main tools for implementing conservation action for Corn Buntings in the UK, and include management options to provide both breeding and wintering habitats. However, the wide species distribution presents financial and practical challenges for achieving adequate coverage. This could be addressed if simpler, cheaper solutions can be identified and deployed over a large proportion of the bird's range. Spatial dispersal processes also may play a part in Corn Bunting population trends although research is currently lacking.

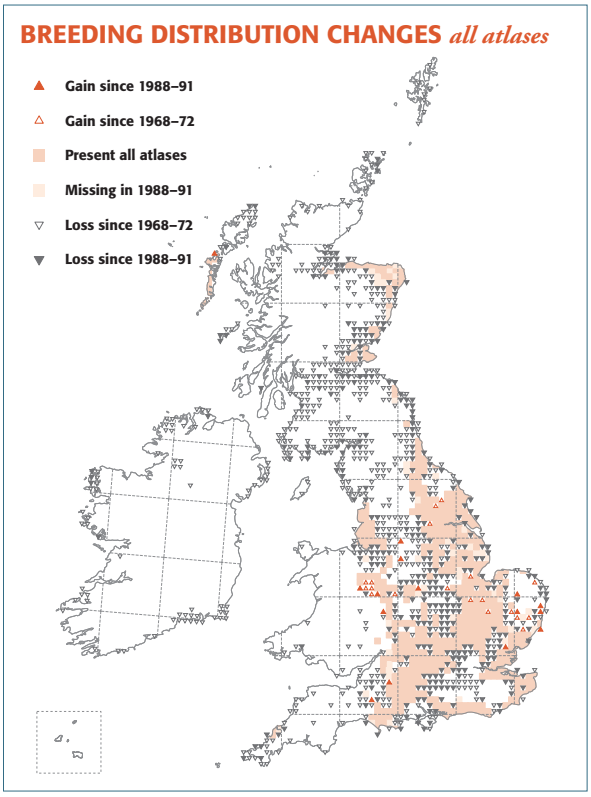


Figure 2 *Bird Atlas 2007–11* data show large-scale range contraction since 1968–72, alongside a population decline of 34% since 1994, as monitored by the BBS.

RECENT RESEARCH

Collaboration between NE and RSPB (through the *Action for Birds in England* programme) has funded research in England since 2006. During this time, we have gained a growing understanding of how breeding season constraints may be limiting population size. Demographic processes in cereal crops have been modelled, revealing low rates of multiple nesting and nest survival. Intensive arable farming appears to have reduced the breeding capacity of Corn Buntings by eliminating arable weeds from cereal crops and simplifying the sward structure within cereal fields. Consequently, Corn Buntings often select thick-sward areas that routinely occur close to crop edges, where nests are more vulnerable to predators foraging from field boundaries. A tailored spring barley-crop solution is helping to sustain the isolated population in north Cornwall by supporting higher re-nesting rates among females (Setchfield *et al.* 2012), while a new winter cereal provision will help to maximise nest survival rates in arable-dominated strongholds, such as the east of England (Setchfield & Peach 2016).

Table 2 Agri-environment scheme (AES) options for Corn Buntings in the UK.
Scheme codes: **1** - Environmental Stewardship; **2** - Countryside Stewardship; **3** - Scotland Rural Development Programme 2007–13; **4** - Scottish Rural Development Programme 2014–20.
Option codes: ✓- primary provisions; (✓) - occasional or secondary provisions.

AES Option	Nest habitat	Chick food	Winter seed	AES Scheme
Double-drilled winter cereal crop (mid-field)	✓			2
Delayed mowing of silage/hay	✓	(✓)		3,4
Water margins	(✓)	✓		3,4
Creation/management of species-rich grassland	(✓)	✓		3,4
Grass margins or beetle banks	(✓)	✓		1,2,3,4
Nectar flower mix		✓		1,2
Flower-rich margins and plots		✓		1,2
Autumn-sown bumblebird mix	(✓)	✓	✓	2
Enhanced / extended overwinter stubble or spring / summer fallow	(✓)	✓	✓	1,2,4
Low input cereals	✓	✓	✓	1,2,3
Unharvested cereal headlands	✓	✓	✓	1,2,4
Wild bird seed mix (annual, cereal-rich)	(✓)	(✓)	✓	1,2,3,4
Ryegrass seed-set	(✓)		✓	1,2
Overwinter stubbles			✓	1,2,3,4
Supplementary winter feeding			✓	1,2

Similarly, the RSPB and SNH have collaborated in Scotland since 2001, to fund Corn Bunting monitoring, research and habitat management. In Aberdeenshire, Corn Buntings often nest in grass silage fields, but these nests are vulnerable to mowing operations in May and June. Management trials showed that nest success was eight times higher when mowing was delayed until late July (Perkins *et al.* 2013), leading to a Corn Bunting-specific AES provision. Monitoring showed that targeted AES provisions which included delayed mowing allowed local Corn Bunting populations to increase (Perkins *et al.* 2011).

Meanwhile, on arable farms in Fife and Angus, increasing the availability of winter seed food is paying dividends. Small plots of specially designed cereal-based seed crops are left unharvested throughout the winter, and their provision on a landscape scale has halted and reversed local population declines. Numbers have almost doubled in Fife, from 75 territorial males in 2001 to 142 in 2017, and recent increases include range expansion. During summer, the seed mix plots mimic weedy cereal fields, thereby also providing Corn Buntings with nest sites and insect-rich foraging habitats.

CONSERVATION OPTIONS

Key requirements for Corn Buntings are good nesting habitat, abundant chick food and abundant winter seed (sometimes referred to as 'the Big 3'). Corn Bunting management options (Table 2) should be provided as a package at the farm-scale.

Loss of chick food, such as through the spraying of insecticides, has been shown to reduce chick growth and survival (Brickle *et al.* 2000). Invertebrate-rich habitats, usually placed along crop boundaries, are often provided by farmers. While these habitats can also expose nests close to crop edges to increased predation risk, farmers can provide double-drilled crop areas to encourage nesting at mid-field locations (Table 2).

Reduction in spring-sown cereal cropping and their overwinter stubbles is a well-known mechanism reducing winter seed food availability for farmland birds. Wild bird seed crops are often provided by farmers and, when annually re-established and rich in cereals, these can attract wintering Corn Bunting flocks. Farmers can also provide supplementary feed between December and April to make up seed short-fall, particularly during the so-called 'hungry gap'. However, a solution has yet to be found for the Hebridean population, which is declining towards extinction, where early harvest of arable silage presents a particular problem. BBS data help prioritise Corn Bunting research. In time, we hope that solutions generated by this research will become widespread and bring about an upturn in the BBS trend for this species.

FIND OUT MORE...

Brickle, N.W., Harper, D.G., Aebischer, N.J. & Cockayne, S.H. 2000. Effects of agricultural intensification on the breeding success of Corn Buntings *Miliaria calandra*. ***Journal of Applied Ecology*** 37, 742–755.

Perkins, A.J., Maggs, H.E., Watson, A. & Wilson, J. D. 2011. Adaptive management and targeting of agri-environment schemes does benefit biodiversity: a case study of the Corn Bunting *Emberiza calandra*. ***Journal of Applied Ecology*** 48(3), 514–522.

Perkins, A.J., Maggs, H.E., Wilson, J.D. & Watson, A. 2013. Delayed mowing increases Corn Bunting *Emberiza calandra* nest success in an agri-environment scheme trial. ***Agriculture, Ecosystems & Environment*** 181, 80–89.

Setchfield, R.P., Mucklow, C., Davey, A., Bradter, U. T. E. & Anderson, G.Q. 2012. An agri-environment option boosts productivity of Corn Buntings *Emberiza calandra* in the UK. ***Ibis*** 154(2), 235–247.

Setchfield, R.P. & Peach, W.J. 2016. The influence of crop tiller density on the breeding performance of a cereal-nesting specialist. ***Journal of Applied Ecology*** 53(5), 1430–1439.

Getting more from BBS data

In a typical year over one million birds are counted on BBS and WBBS transects and we are constantly looking at ways to distil ever more information from these invaluable data.

By **Simon Gillings**, Head of Population Ecology & Modelling, BTO

A critical but often overlooked aspect of the BBS is the intense analytical activity in the months that precede the publication of the annual BBS report. For about a month, multiple computers are running 24/7 to produce the trends seen in these pages. We've used broadly the same statistical models since BBS began, but with over 20 years of data, we can ask whether small changes can improve the accuracy or value of trends.

SAMPLE SIZE MATTERS

An unavoidable truth for any survey is the smaller the sample size, the less confident one can be about the results. But how small is too small? We routinely report UK trends for species recorded in at least 40 squares per year on average, with a lower threshold of 30 squares for country and regional trends. We are exploring whether there are specific cases, such as where a species has a very concentrated distribution, where it might be safe to relax this restriction. This might allow us to produce regional trends for new species.

SHORT-TERM TRENDS

A side effect of this way of judging sample sizes is that for colonising or rapidly expanding species, it takes years to break the threshold. For example, we cannot yet produce a long-term (1995–2016) trend for Cetti's Warbler in England. Despite being recorded in more than 30 squares per year for the last decade, in the first decade of BBS it was recorded in only 2–12 squares, giving an average annual sample size of 27 squares.

In this report we introduce new short-term trends, produced for the last five and 10 years. They solve the threshold problem for rapidly expanding species like Cetti's Warbler (2006–2016: +154%; 2011–2016: +102%) whilst also offering new insights for more routinely reported species with recently divergent trends. For example, we report negligible long-term change for Collared Dove (1995–2016: +2%) but the 10-year trend shows a 21% decline.

CETTI'S WARBLER: GRAHAM CATLEY

WIDER INSIGHTS

Many countries do not have a dedicated pool of surveyors to make a survey like BBS possible. In such places, small amounts of data collected by resident surveyors may be supplemented by records from visiting birders using online portals such as BirdTrack. One of BirdTrack's aims is to produce trends for data deficient areas and species through analysis of 'Complete Lists' which offer presence/absence style information for locations through time. The things that make BBS so powerful – random squares, fixed effort, count data – are often lacking in BirdTrack-type data.

We can learn a lot by "degrading" BBS data and testing whether we can still extract the correct trends. Turning BBS counts into presence/absence information has helped us to identify the types of species for which list type data can, and cannot, be used to produce trends. BBS will always be the superior scheme for monitoring widespread species, but in future we hope to be able to combine BBS and BirdTrack data to produce trends for some of our scarcer breeders.

Interpreting BBS and WBBS results

The pages which follow (pages 14–25) contain the annual bird population trend statistics for the Breeding Bird Survey (BBS) and pages 34–35 cover the Waterways Breeding Bird Survey (WBBS) results. For the most part, the table and graph layouts are the same: some guidance on reading these tables and graphs is therefore provided here, with other relevant hints on interpreting the information displayed.

THRESHOLDS FOR TRENDS

To ensure robust results we produce trends only for species with sufficient data. To judge this we look at the average number of squares per year on which a species has been recorded during the trend period. For UK trends we consider species above a reporting threshold of 40 squares.

For countries within the UK, English Regions and UK WBBS trends, the threshold is 30 squares during the trend period.

The one-year trend from 2016–2017, is shown where the sample size reaches the reporting threshold for one of the longer trend periods. Therefore, if there is a 10-year or 'all-time' trend, a one-year trend is presented.

BBS 'ADD-ON' SQUARES

'Add-on' squares surveyed over the lifetime of the BBS, using BBS methodologies, have been included in these trends. These include Upland BBS, Upland Adjacent and Scottish Woodland squares. Upland BBS and Scottish Woodland squares were originally surveyed by professional fieldworkers: Scottish Woodland squares are now surveyed by volunteers.

Upland Adjacent squares are also covered by volunteers during visits to survey their core BBS square: these were introduced as an option to increase coverage in remote upland areas.

ONLINE RESOURCES...

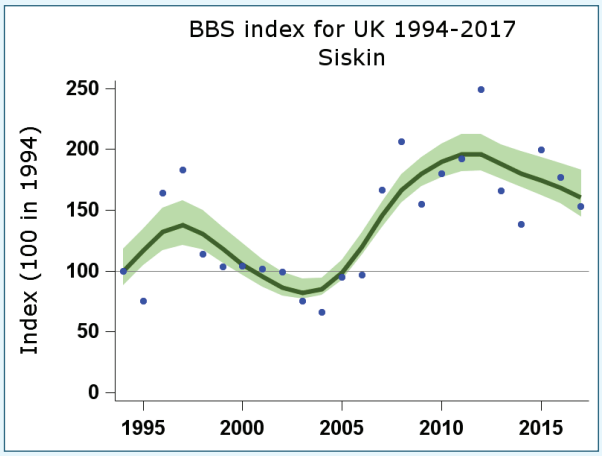
BBS Trend graphs online: www.bto.org/bbs-graphs
BBS Trend tables online: www.bto.org/bbs-tables
WBBS results online:
www.bto.org/volunteer-surveys/wbbs/results

INTERPRETING GRAPHS

All BBS and WBBS graphs are displayed in the same way throughout the report. Beware, however, that the index axis does vary in scale as do the time periods covered.

BBS index graphs show:

- smoothed trend – dark green line
- confidence interval – pale green shading
- annual index values – blue dots



TRENDS AND TABLES EXPLAINED

Species	Min. sample	1-year (16–17)	10-year (06–16)	21-year (95–16)	LCL	UCL
Cuckoo	683	**-3**	**-11 ***	**-43 ***	-49	-37
(Barn Owl)	50	**48 ***	**-19 ***	**238 ***	134	440

- Trends for species in brackets are reported with caveats (see page 26).
- **Red-listed** and **Amber-listed** species from 'Birds of Conservation Concern 4' are shown in the relevant colour.
- The 'Min. sample' is the mean number of squares per year on which the species was recorded during BBS or WBBS. The figure shown in the tables is the smaller of the sample sizes for the 10- and all-year trends, per species, per region.
- Trends are presented as the percentage change over three periods: 2016–17, 2006–16 and 1995–2016.
- The short-term change covers the most recent year of the survey, i.e. for BBS and WBBS: 2016 to 2017.
- The long-term changes for both BBS and WBBS, cover the lifetime of the survey (BBS: 1994–2017, WBBS: 1998–2017). The 10-year trends cover 2005–2017 for both surveys. All time periods have been smoothed, and the end years truncated.
- Trends with statistically significant changes are marked with an asterisk (*), where the 95% confidence limits of the change do not overlap zero.
- LCL and UCL are the lower and upper 95% confidence limits for the longest BBS trend: 1995–2016, and 1999–2016 for WBBS.

United Kingdom – population trends

Corn Bunting declined by 34% in the UK between 1995 and 2016

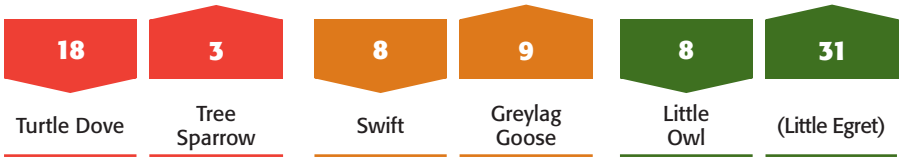
Data from BBS squares across the UK have been used to calculate population trends for 117 bird species, of which, six are new for 2017. There are shorter-term trends (five and 10 years) for all species which reach the reporting threshold for the UK, per time period. Mandarin Duck and Nightingale are also included due to reaching the lower reporting threshold set for England.

STATISTICALLY SIGNIFICANT RESULTS

Period	No. species	Greatest change	
Long-term (95–16) increases	**43**	Little Egret:	**2,365%**
Long-term (95–16) declines	**34**	Turtle Dove:	**-94%**
Short-term (16–17) increases	**23**	(Barn Owl):	**48%**
Short-term (16–17) declines	**7**	Spotted Flycatcher:	**-32%**

▼ Total number of long-term (1995–2016) statistically significant results by **Birds of Conservation Concern 4** (BoCC4) status: Red, Amber or Green.

▼ Total number of long-term (1995–2016) increasing or declining by BoCC4 status, followed by the species with the greatest population change for each status list.



SHORTER-TERM TRENDS

As shorter-term trends are now being calculated, species previously too uncommon or localised for trend production are now included. Further to this, shorter-term trends are also calculated for existing BBS species, allowing further insights into population changes over time.

These additional trends are over five- (2011–16) and 10-year (2006–16) periods, with the latter reported here and the five-year trends published online at **www.bto.org/bbs-tables**. As with previous reports, 21-year (all years) and one-year trends are reported here. See page 13 for more information on trends and thresholds.

REACHING THRESHOLDS

Calculating new, shorter-term trends allows the BBS to enhance the monitoring of **Egyptian Goose**, **Teal**, **Indian Peafowl**, **Marsh Harrier**, **Ring Ouzel** and **Cetti's Warbler** in the UK.

FALLING SHORT

Some species do not reach the threshold for reporting recent shorter-term trends. Species such as **Willow Tit** and **Pied Flycatcher** are becoming so localised that the average sample sizes over the last five and 10 years are too small to calculate trends. **Willow Tit** has declined by 81% and **Pied Flycatcher** by 38% from 1995 to 2016.

FARMLAND BIRDS

Shorter-term trends allow a closer look at population changes over time. In farmland birds, for example, they can reveal responses to recent land-use and management change, and further direct future research.

Stock Dove shows increasing trends during the various time-periods; with an increase of 22% during 1995–2016 and 25% during 2006–16. A recovery following the effects of organochlorine seed-dressing, which caused high mortality and was used up to the early 1960s, is thought to have aided this increase, with the addition of an increase in breeding performance with more fledglings per nest than previously.

Kestrel, however, has declined consistently. Many theories are suggested for the 10-year (2006–16) 31% and all-year (1995–2016) 35% declines. They include changes in agricultural practices reducing prey availability, increased road collisions, and interactions with other more dominant raptor species. Research is underway to help understand the causes of decline.

Are changes afoot for the long-distance migrant, **Yellow Wagtail**? A long-term (1995–2016) decline of 43% masks a more recent, though non-statistically significant, 7% increase over the last 10 years (2006–16). With historical changes to agricultural practices reducing foraging and breeding habitats and the possibility of negative influences in the wintering areas of western Africa, could things be changing? More research is required to analyse this pattern further, but it does show how the Breeding Bird Survey really can be an early warning system for change and direct further research.

FIND OUT MORE...

Eaton, M.A., Aebischer, N.J., Brown, A.F., Hearn, R.D., Lock, L., Musgrove, A.J., Noble, D.G., Stroud, D.A. & Gregory, R.D. 2015. Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. ***British Birds*** 108: 708–746. (www.britishbirds.co.uk/wp-content/uploads/2014/07/BoCC4.pdf).

Table 3 UK population trends during 2016–17, 2006–16 and 1995–2016

Species	Min. sample	1-year (16–17)	10-year (06–16)	21-year (95–16)	LCL	UCL
Canada Goose	530	34 *	-8	82 *	50	130
Greylag Goose	253	-28	40	190 *	28	565
Mute Swan	268	34	15	33 *	0	72
Egyptian Goose	42	27	89 *			
Shelduck	152	-16 *	-13	-12	-52	35
Mandarin Duck	34	36	77 *	414 *	171	1,000
Gadwall	44	19	104 *	171 *	47	447
Mallard	1,396	-8	-1	17 *	6	31
Teal	42	16	46			
Tufted Duck	165	1	10	45 *	8	99
Goosander	44	31	16	-23	-52	50
Red Grouse	150	38 *	55 *	19	-3	44
Red-legged Partridge	585	29 *	-13 *	10	-3	24
Grey Partridge	222	2	-36 *	-60 *	-68	-50
Pheasant	1,960	14 *	-2	32 *	24	40
Indian Peafowl	41	-3	-14			
Little Grebe	73	-7	15	38 *	0	88
Great Crested Grebe	75	13	-18	7	-29	40
(Grey Heron)	683	3	-25 *	-11	-22	1
(Little Egret)	51	31 *	75 *	2,365 *	598	>10,000
(Cormorant)	258	9	-1	24	-11	67
Sparrowhawk	356	0	-22 *	-19 *	-29	-6
Marsh Harrier	40	-23	52 *			
Red Kite	161	11	274 *	1,457 *	821	3,195
Buzzard	1,135	6	24 *	93 *	72	120
Moorhen	665	2	-26 *	-12	-20	0
Coot	284	3	-17 *	15	-8	44
Oystercatcher	365	10	-11 *	-23 *	-34	-13
Lapwing	691	7	-34 *	-42 *	-48	-31
Golden Plover	65	32	-7	-15	-33	12
Curlew	529	4	-17 *	-48 *	-54	-42
Snipe	172	15	-9	26	-1	51
Common Sandpiper	73	-17	-2	-21	-39	1
Redshank	87	-14	-24	-41 *	-62	-9
(Common Tern)	69	194	82	89	-35	259
Feral Pigeon	715	-2	-21 *	-24 *	-34	-9
Stock Dove	868	11 *	25 *	22 *	7	37
Woodpigeon	2,668	0	3	33 *	26	42
Turtle Dove	76	78	-84 *	-94 *	-96	-90
Collared Dove	1,424	6 *	-21 *	2	-5	10
Cuckoo	683	-3	-11 *	-43 *	-49	-37
(Barn Owl)	50	48 *	-19 *	238 *	134	440
(Tawny Owl)	95	17	-11	-27 *	-43	-7
Little Owl	92	-23	-46 *	-58 *	-68	-45
Swift	1,052	1	-39 *	-53 *	-59	-47
Kingfisher	57	-6	-15	-7	-36	50
Gt Spotted Woodpecker	1,174	3	6	126 *	109	146
Green Woodpecker	863	-7	-13 *	28 *	18	40
Kestrel	681	27 *	-31 *	-35 *	-42	-27
Hobby	45	1	-12	-15	-41	26
Peregrine	52	-23	-8	-25	-48	17
Ring-necked Parakeet	83	2	124 *	1,480 *	569	8,570
Jay	832	-1	4	14 *	4	24
Magpie	2,021	3	0	-2	-7	4
Jackdaw	1,881	8	24 *	55 *	40	71
Rook	1,383	-4	-16 *	-21 *	-30	-11
Carrion Crow	2,537	-1	1	18 *	11	27
Hooded Crow	140	5	17 *	14	-15	46
Raven	344	-7	-4	36	0	99

Species	Min. sample	1-year (16–17)	10-year (06–16)	21-year (95–16)	LCL	UCL
Coal Tit	883	5	-10 *	-3	-15	7
Marsh Tit	148	9	-37 *	-45 *	-54	-36
Willow Tit	46	25		-81 *	-89	-72
Blue Tit	2,473	-5 *	-12 *	-3	-7	1
Great Tit	2,353	-7 *	-9 *	30 *	25	36
Skylark	1,825	1	-13 *	-20 *	-25	-14
Sand Martin	141	7	20	48	-18	164
Swallow	2,104	0	-16 *	12 *	5	20
House Martin	973	2	-22 *	-12 *	-21	-1
Cetti's Warbler	49	0	154 *			
Long-tailed Tit	1,042	-4	12 *	21 *	10	36
Willow Warbler	1,441	14 *	6	-9 *	-17	-2
Chiffchaff	1,696	7 *	66 *	125 *	112	141
Wood Warbler	53	-19	-18	-62 *	-78	-39
Sedge Warbler	311	10	-15 *	-10	-32	16
Reed Warbler	137	10	-1	28 *	4	62
Grasshopper Warbler	86	39 *	-11	-7	-37	33
Blackcap	1,769	6 *	63 *	143 *	128	158
Garden Warbler	459	12	-9	-25 *	-36	-13
Lesser Whitethroat	291	-2	16 *	6	-8	25
Whitethroat	1,464	-3	12 *	27 *	18	41
Goldcrest	857	10 *	-9	20 *	1	45
Wren	2,624	1	14 *	40 *	35	46
Nuthatch	558	2	28 *	87 *	63	122
Treecreeper	380	-6	4	7	-8	25
Starling	1,799	5	-30 *	-51 *	-56	-47
Ring Ouzel	44	-7	37			
Blackbird	2,644	6 *	1	24 *	20	29
Song Thrush	2,144	8 *	6 *	32 *	26	39
Mistle Thrush	1,194	-5	-20 *	-24 *	-30	-18
Spotted Flycatcher	183	-32 *	-6	-39 *	-54	-20
Robin	2,541	-2	9 *	31 *	25	36
Nightingale	33	-29	-25	-59 *	-73	-32
Pied Flycatcher	40	-6		-38	-72	8
Redstart	187	-13 *	40 *	31 *	10	54
Whinchat	77	-12	-20	-53 *	-67	-34
Stonechat	164	31 *	-35 *	92 *	44	166
Wheatear	361	-18	-15	-26 *	-40	-6
Dipper	64	-14	-17	-25	-46	12
House Sparrow	1,705	9 *	1	-6	-12	1
Tree Sparrow	198	-2	42 *	112 *	61	176
Dunnock	2,212	-1	2	23 *	17	29
Yellow Wagtail	165	-16	7	-43 *	-53	-28
Grey Wagtail	229	29 *	-25 *	1	-15	23
Pied Wagtail	1,338	1	-2	1	-8	8
Meadow Pipit	845	-2	7	-7 *	-14	0
Tree Pipit	148	9	16	3	-21	32
Chaffinch	2,652	-9 *	-19 *	-8 *	-12	-4
Bullfinch	670	17 *	29 *	16 *	6	28
Greenfinch	1,811	-22 *	-64 *	-54 *	-57	-49
Linnet	1,270	1	5	-18 *	-24	-7
Lesser Redpoll	177	39 *	35 *	38 *	9	87
Crossbill	59	-9	-21	-27	-54	22
Goldfinch	1,826	12 *	68 *	136 *	119	148
Siskin	204	-14	40 *	44 *	8	96
Corn Bunting	145	-12	-5	-34 *	-50	-17
Yellowhammer	1,230	-5	-6 *	-18 *	-24	-12
Reed Bunting	536	16 *	9 *	39 *	21	62

INTERPRETING THE RESULTS: see page 13 **TREND GRAPHS ONLINE:** www.bto.org/bbs-graphs

England – population trends

Whinchat declined by 44% in England between 1995 and 2016

Once again, 105 long-term trends were produced for England but with the addition of seven species for which it is possible to calculate shorter-term trends of five and 10 years. As with the UK, there are shorter-term trends for Egyptian Goose, Indian Peafowl, Marsh Harrier, Ring Ouzel and Cetti's Warbler, plus for England, Golden Plover and Crossbill.

STATISTICALLY SIGNIFICANT RESULTS

Period	No. species	Greatest change	
Long-term (95–16) increases	**38**	Red Kite:	**18,669%**
Long-term (95–16) declines	**36**	Turtle Dove:	**-94%**
Short-term (16–17) increases	**15**	(Little Egret):	**32%**
Short-term (16–17) declines	**10**	Whinchat:	**-37%**

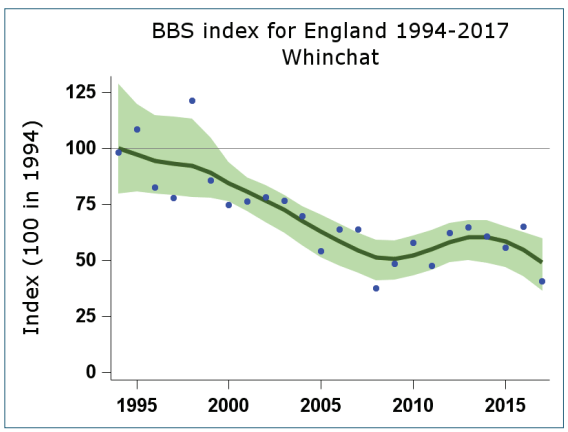
WINTERING WHINCHAT

Localised in England, **Whinchat** occur in northern uplands and in pockets in the south, such as the Salisbury Plain and the south-west.

Overwintering in the humid-zone of west Africa, it is hard to know what could have caused the reduced overwinter survival recorded in **Whinchat** since the early 1990s, and whether the cause lies on the wintering grounds or, as research suggests, along the migration routes.

Historically, **Whinchats** have been lost from the UK's lowlands due to changing farming practices and the resulting loss of marginal habitats, home to invertebrate prey.

The European trend shows a decline, by 88% from 1980 to 2015, and in England, there has been a 44% decline between 1995 and 2016.



CELEBRATING CETTI'S

Of the shorter-term trends, **Cetti's Warbler** has seen the greatest change of all the new additions, having increased by 180% between 2006 and 2016. First recorded breeding in Kent in 1973, after range expansion in north-west Europe, this species has increased steadily, albeit with the occasional set-back in particularly harsh winters when this (largely sedentary) species struggles. Previously thought of as a species of south-eastern England, it is expanding in range each year and was first recorded breeding north of the Humber in 2006.

NON-NATIVE RECORDING

Egyptian Goose and **Indian Peafowl** are non-native species in England, and with shorter-term trends it is now possible to calculate 10-year trends for both, with **Egyptian Goose** increasing by 89% and, although not yet statistically significant, **Indian Peafowl** has increased by 31%, since 2006. This nicely illustrates the value of recording non-native species during the BBS to enable calculations of their trends.

FIND OUT MORE...

PECBMS. 2017. *Trends of common birds in Europe, 2017 update.* (www.ebcc.info/index.php?ID=631).

Blackburn, E. & Cresswell, W. 2016. High within-winter and annual survival rates in a declining Afro-Palaearctic migratory bird suggest that wintering conditions do not limit populations. ***Ibis*** 158: 92–105.

WHINCHAT: JOHN PROUDLOCK

Table 4 Trends in England during 2016–17, 2006–16 and 1995–2016

Species	Min. sample	1-year (16–17)	10-year (06–16)	21-year (95–16)	LCL	UCL
Canada Goose	488	37	-10	66 *	34	117
Greylag Goose	209	27	81 *	323 *	158	772
Mute Swan	229	39	13	23	-12	61
Egyptian Goose	42	27	89 *			
Shelduck	124	-22 *	-6	20	-27	56
Mandarin Duck	33	22	69 *	409 *	150	1,160
Gadwall	42	25	122 *	151 *	31	421
Mallard	1,168	-9	-2	27 *	11	45
Tufted Duck	143	-5	4	26	-6	75
Red Grouse	88	2	48 *	11	-20	56
Red-legged Partridge	565	26 *	-15 *	3	-10	16
Grey Partridge	198	2	-36 *	-58 *	-66	-48
Pheasant	1,643	13 *	-3	32 *	23	41
Indian Peafowl	38	4	31			
Little Grebe	57	0	3	13	-25	92
Great Crested Grebe	68	11	9	-4	-31	24
(Grey Heron)	561	-7	-27 *	-20 *	-29	-8
(Little Egret)	47	32 *	75 *	2,197 *	648	>10,000
(Cormorant)	215	6	-4	16	-7	51
Sparrowhawk	295	-3	-27 *	-25 *	-34	-16
Marsh Harrier	35	-25	50 *			
Red Kite	121	7	406 *	18,669 *	1,0113	>10,000
Buzzard	787	6	55 *	211 *	164	281
Moorhen	615	2	-25 *	-13 *	-22	-3
Coot	257	6	-16 *	18	-5	48
Oystercatcher	204	3	11	49 *	16	86
Lapwing	581	2	-30 *	-26 *	-36	-16
Golden Plover	38	-16	32			
Curlew	346	3	-9 *	-30 *	-39	-20
Snipe	93	15	19	25	-8	70
Common Sandpiper	31	-11	-17	-47 *	-67	-21
Redshank	62	-10	-32 *	-39 *	-57	-14
(Common Tern)	64	-7	3	41	-12	142
Feral Pigeon	582	2	-27 *	-31 *	-40	-20
Stock Dove	800	13 *	26 *	22 *	6	37
Woodpigeon	2,128	-2	1	36 *	28	43
Turtle Dove	74	86	-84 *	-94 *	-96	-90
Collared Dove	1,238	8 *	-24 *	-1	-8	7
Cuckoo	501	-2	-37 *	-70 *	-74	-65
(Barn Owl)	48	31	-17	256 *	143	523
(Tawny Owl)	82	1	-15	-26 *	-43	0
Little Owl	89	-19	-46 *	-58 *	-69	-46
Swift	908	-1	-37 *	-53 *	-59	-45
Kingfisher	51	-6	-18	1	-31	43
Gt Spotted Woodpecker	1,019	4	-4	99 *	81	113
Green Woodpecker	808	-6 *	-12 *	37 *	26	49
Kestrel	602	21 *	-22 *	-20 *	-27	-12
Hobby	43	-1	-10	-12	-38	28
Peregrine	32	13	-13	50	-20	193
Ring-necked Parakeet	83	2	124 *	1,480 *	593	8,199
Jay	715	-9 *	-1	1	-7	11
Magpie	1,688	0	2	0	-5	4
Jackdaw	1,513	9 *	31 *	68 *	56	82
Rook	1,103	5	-11 *	-13 *	-23	-2
Carrion Crow	2,082	-2	7 *	29 *	20	39
Raven	164	-6	33 *	68 *	6	343

Species	Min. sample	1-year (16–17)	10-year (06–16)	21-year (95–16)	LCL	UCL
Coal Tit	593	11 *	5	20 *	3	41
Marsh Tit	135	10	-29 *	-43 *	-54	-31
Willow Tit	35	-5	-54 *	-84 *	-91	-75
Blue Tit	2,003	-5 *	-11 *	-4 *	-8	0
Great Tit	1,903	-7 *	-13 *	24 *	18	30
Skylark	1,456	-3	-11 *	-23 *	-28	-18
Sand Martin	88	31	-1	2	-27	51
Swallow	1,616	1	-14 *	10 *	2	18
House Martin	750	-8	-31 *	-29 *	-37	-20
Cetti's Warbler	46	-4	180 *			
Long-tailed Tit	921	8	10 *	16 *	3	26
Willow Warbler	951	21 *	-11 *	-40 *	-48	-33
Chiffchaff	1,421	6 *	63 *	128 *	113	143
Sedge Warbler	197	7	-8	-18	-36	7
Reed Warbler	130	9	3	27 *	1	77
Grasshopper Warbler	40	20	-10	-28	-50	8
Blackcap	1,501	5 *	53 *	116 *	100	132
Garden Warbler	373	12	-12 *	-31 *	-39	-19
Lesser Whitethroat	279	-7	20 *	7	-7	28
Whitethroat	1,256	-2	12 *	25 *	15	34
Goldcrest	615	8	19 *	53 *	26	89
Wren	2,049	-2	18 *	33 *	28	40
Nuthatch	476	1	25 *	89 *	68	117
Treecreeper	284	-7	10	-2	-15	13
Starling	1,463	1	-37 *	-61 *	-64	-58
Ring Ouzel	31	10	-19			
Blackbird	2,103	4 *	0	21 *	17	26
Song Thrush	1,674	4 *	5 *	28 *	21	37
Mistle Thrush	941	1	-24 *	-36 *	-40	-29
Spotted Flycatcher	122	-26 *	-43 *	-65 *	-74	-55
Robin	2,006	-2	11 *	35 *	29	40
Nightingale	33	-29	-25	-58 *	-77	-31
Redstart	103	-6	38 *	16	-7	52
Whinchat	33	-37 *	-7	-44 *	-68	-23
Stonechat	71	11	-24 *	94 *	35	192
Wheatear	202	21	-7	-17	-41	18
Dipper	31	5	-5	-41	-67	7
House Sparrow	1,386	8 *	0	-17 *	-23	-10
Tree Sparrow	154	-1	34 *	64 *	23	121
Dunnock	1,800	-2	2	18 *	12	24
Yellow Wagtail	161	-16	8	-42 *	-51	-29
Grey Wagtail	155	16	-16 *	13	-8	41
Pied Wagtail	1,009	-4	-6 *	0	-7	7
Meadow Pipit	452	4	4	-11	-24	3
Tree Pipit	74	9	-20	-47 *	-68	-21
Chaffinch	2,065	-11 *	-24 *	-11 *	-16	-6
Bullfinch	519	5	30 *	12	0	27
Greenfinch	1,530	-21 *	-62 *	-51 *	-54	-47
Linnet	1,028	-1	16 *	-19 *	-26	-10
Lesser Redpoll	68	-5	50	0	-35	85
Crossbill	34	87	7			
Goldfinch	1,503	11 *	80 *	132 *	113	148
Siskin	78	1	53 *	53	-18	263
Corn Bunting	138	-13	-8	-33 *	-48	-15
Yellowhammer	1,067	-6 *	-13 *	-28 *	-33	-23
Reed Bunting	405	4	19 *	44 *	25	69

INTERPRETING THE RESULTS: see page 13
TREND GRAPHS ONLINE: www.bto.org/bbs-graphs
TREND TABLES ONLINE: www.bto.org/bbs-tables

Scotland – population trends

Jay increased by 51% in Scotland between 2006 and 2016

As in the 2016 report, 64 long-term trends were produced for Scotland in 2017. New shorter-term five- and 10-year trends brought additions to the trend set for Scotland where sample size allowed for a robust trend to be calculated. Stock Dove, Jay and Garden Warbler now have both five- and 10-year trends, Spotted Flycatcher has a five-year trend and Crossbill has a 10-year trend.

STATISTICALLY SIGNIFICANT RESULTS

Period	No. species	Greatest change	
Long-term (95–16) increases	**24**	Chiffchaff:	**775%**
Long-term (95–16) declines	**9**	Kestrel:	**-65%**
Short-term (16–17) increases	**10**	Kestrel:	**104%**
Short-term (16–17) declines	**2**	Long-tailed Tit:	**-58%**

ALL THE TRENDS

Sixty-four of the 69 species now with trends for Scotland have a one-year trend, a five-year trend, 10-year trend and all-time trend.

Stock Dove, **Jay** and **Garden Warbler** all have five- and 10-year trends. These show declines in both **Stock Dove** and **Garden Warbler**, but increases in **Jay**. The trends for the former two species are not statistically significant but with time and continued high sample size, changes should be detected with greater confidence.

Jay has increased in Scotland by 51% over the last 10 years, and by 20% over the last five years (the latter reported online, see opposite page). Brood size and fledging success have increased in the species since 1986.

Bird Atlas 2007–11 revealed a 14% range expansion across Britain between 1968–72 and 2008–11, as shown in Figure 3. Afforestation, with many areas not being keepered, is suggested as a contributing factor to this increase.

CHANGES AFOOT?

Meadow Pipit has suffered a 10% decline in Scotland from 1995 to 2016, but the 10-year trend shows a 12% increase and the five-year trend, a 21% increase.

Being the commonest passerine above 500-m in Scotland, an increase in participation within the upland-focused elements of BBS, such as 'Upland Rovers' and adding an 'Upland Adjacent' square to an existing 'core' BBS square, should allow for a more well-rounded representation of **Meadow Pipit** population changes in Scotland. Thus representing both the lowland and upland habitats in the trends. Despite the need for improved coverage, both the long-term and shorter-term trends for **Meadow Pipit** show statistically significant changes.

BREEDING DISTRIBUTION CHANGES *all atlases*

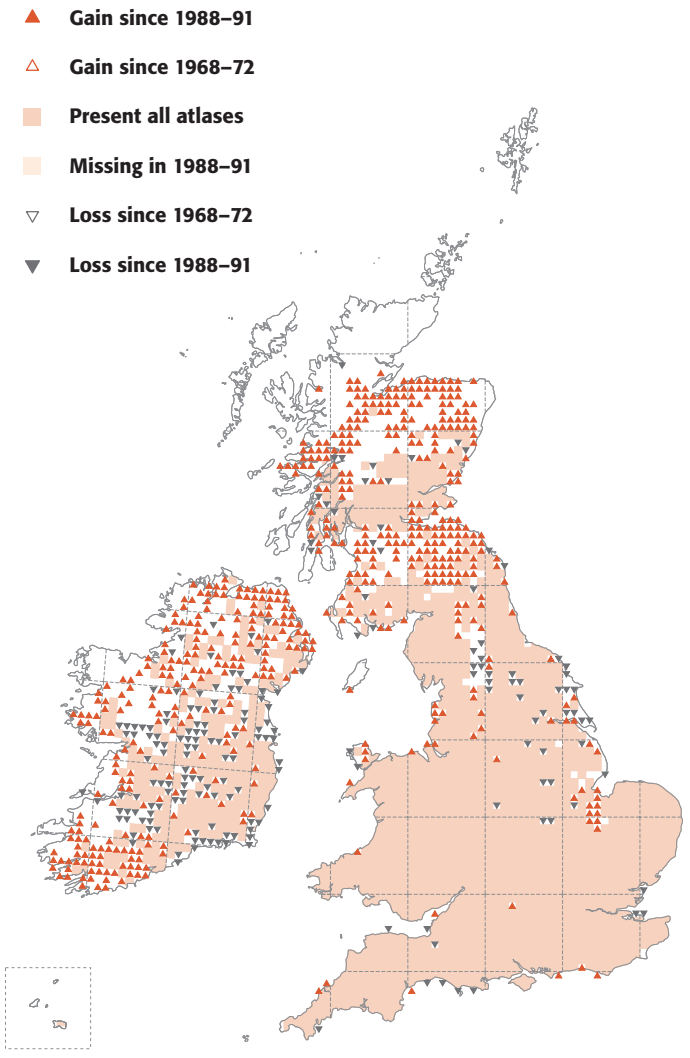


Figure 3 *Bird Atlas 2007–11* map showing changes in the breeding distribution of **Jay** over time. Expansion is most pronounced in Scotland and Ireland.

FIGURE 2: REPRODUCED FROM BIRD ATLAS 2007–2011 (BALMER ET AL. 2013) WHICH WAS A JOINT PROJECT BETWEEN BTO, BIRDWATCH IRELAND AND THE SCOTTISH ORNITHOLOGISTS' CLUB

FOCUSED INSIGHTS

New shorter-term trends are calculated for the past five and 10 years. This has allowed BBS to start monitoring additional species at UK and country levels.

For Scotland this means the addition of a five-year **Spotted Flycatcher** trend, showing an increase of 66% between 2011 and 2016. Welcome news for a species in long-term decline across the UK, by 39% (1995–2016).

Ten-year trends are included within this report and five-year trends can be found online at **www.bto.org/bbs-tables**.

SPOTTED FLYCATHCER: JAMIE MACARTHUR

Table 5 Trends in Scotland during 2016–17, 2006–16 and 1995–2016

Species	Min. sample	1-year (16–17)	10-year (06–16)	21-year (95–16)	LCL	UCL
Greylag Goose	31	**-60**	**13**	**113**	-47	716
Mallard	115	**-9**	**1**	**-14**	-29	7
Red Grouse	57	**63** *	**48** *	**20**	-12	54
Pheasant	158	**19**	**3**	**18**	-6	44
(Grey Heron)	55	**19**	**-25**	**5**	-26	52
Buzzard	159	**4**	**-9**	**22** *	1	53
Oystercatcher	140	**14**	**-19** *	**-38** *	-49	-28
Lapwing	88	**-14**	**-39** *	**-57** *	-69	-45
Golden Plover	35	**50**	**-15**	**-23**	-48	2
Curlew	129	**4**	**-24** *	**-61** *	-68	-52
Snipe	63	**14**	**-16**	**26**	-5	72
Common Sandpiper	36	**-17**	**-3**	**-18**	-41	3
Feral Pigeon	72	**-7**	**-9**	**-3**	-40	58
Stock Dove	31	**18**	**-12**			
Woodpigeon	233	**5**	**11**	**10**	-12	34
Collared Dove	60	**-20**	**-2**	**10**	-33	73
Cuckoo	81	**-8**	**16** *	**30** *	5	63
Swift	55	**32**	**-42** *	**-59** *	-70	-41
Gt Spotted Woodpecker	61	**12**	**50** *	**419** *	272	670
Kestrel	40	**104** *	**-53** *	**-65** *	-78	-40
Jay	36	**85** *	**51** *			
Magpie	60	**21**	**26** *	**48** *	6	121
Jackdaw	135	**12**	**18**	**24**	-9	61
Rook	122	**-22**	**-24**	**-35** *	-49	-6
Carrion Crow	217	**6**	**-16** *	**-7**	-29	22
Hooded Crow	54	**-13**	**-11**	**-31**	-55	5
Raven	54	**-12**	**-14**	**20**	-14	85
Coal Tit	144	**0**	**-19** *	**-16**	-33	5
Blue Tit	185	**2**	**-15** *	**0**	-16	18
Great Tit	175	**-3**	**3**	**52** *	29	88
Skylark	227	**10**	**-19** *	**-16**	-29	3
Sand Martin	35	**-8**	**54**	**109**	-11	572
Swallow	200	**-10**	**-14**	**19**	-1	43
House Martin	77	**33**	**5**	**128** *	52	229

Species	Min. sample	1-year (16–17)	10-year (06–16)	21-year (95–16)	LCL	UCL
Long-tailed Tit	34	**-58** *	**32**	**51**	-8	141
Willow Warbler	235	**13** *	**11**	**21** *	2	44
Chiffchaff	70	**21**	**186** *	**775** *	395	1,502
Sedge Warbler	60	**11**	**-13**	**17**	-34	76
Blackcap	77	**2**	**108** *	**440** *	284	748
Garden Warbler	30	**6**	**-7**			
Whitethroat	93	**-2**	**20**	**122** *	17	239
Goldcrest	100	**15**	**-35** *	**23**	-14	71
Wren	251	**6**	**4**	**79** *	57	108
Treecreeper	41	**-2**	**-9**	**8**	-26	63
Starling	162	**10**	**-22** *	**-25**	-41	1
Blackbird	222	**7**	**7**	**36** *	9	65
Song Thrush	198	**16** *	**14** *	**42** *	19	68
Mistle Thrush	84	**-24**	**-8**	**28**	-4	75
Robin	221	**-6**	**7**	**37** *	15	61
Stonechat	39	**64** *	**-49** *	**63**	-7	169
Wheatear	87	**-32** *	**-21**	**-31** *	-48	-8
House Sparrow	112	**18** *	**5**	**46** *	8	89
Tree Sparrow	32	**-15**	**141** *	**391** *	140	1,023
Dunnock	158	**3**	**1**	**49** *	24	78
Grey Wagtail	33	**66** *	**-41** *	**-11**	-38	38
Pied Wagtail	150	**10**	**3**	**-5**	-22	12
Meadow Pipit	228	**-3**	**12** *	**-10** *	-21	-1
Tree Pipit	37	**12**	**47** *	**85** *	41	157
Chaffinch	266	**-7**	**-12** *	**-1**	-13	9
Bullfinch	47	**49** *	**51** *	**45** *	9	130
Greenfinch	107	**-13**	**-65** *	**-61** *	-73	-47
Linnet	97	**25**	**-15**	**-8**	-36	25
Lesser Redpoll	54	**54** *	**73** *	**58** *	5	156
Crossbill	33	**-33**	**-23**			
Goldfinch	114	**22**	**64** *	**197** *	117	309
Siskin	84	**-14**	**35** *	**42** *	6	93
Yellowhammer	121	**0**	**20** *	**34** *	9	61
Reed Bunting	68	**45**	**-1**	**58** *	10	115

FIND OUT MORE...

Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. & Fuller, R.J. 2013. *Bird Atlas 2007–11: the breeding and wintering birds of Britain and Ireland.* BTO Books, Thetford.

INTERPRETING THE RESULTS: see page 13

TREND GRAPHS ONLINE: www.bto.org/bbs-graphs

Wales – population trends

Red Kite increased by 368% in Wales between 1995 and 2016

Canada Goose and Red Kite now reach the reporting threshold for long-term and shorter-term trends, along with the one-year trend. In addition to this, it is now possible to report five- and 10-year trends for Grey Wagtail and Lesser Redpoll, bringing the total number of species with trends in Wales to 60. Despite being able to calculate a long-term trend for Yellowhammer, the sample size is now too low to calculate shorter-term trends for this declining species.

STATISTICALLY SIGNIFICANT RESULTS

Period	No. species	Greatest change	
Long-term (95–16) increases	21	Canada Goose:	432%
Long-term (95–16) declines	9	Starling:	-72%
Short-term (16–17) increases	5	Curlew:	111%
Short-term (16–17) declines	6	Siskin:	-35%

RED KITES SOAR

For the first time, it is possible to produce long-term population trends for **Red Kite** and **Canada Goose** in Wales as average sample size over the years reaches the reporting threshold for robust trends.

Fewer than 10 breeding pairs of **Red Kite** remained in the UK during the 1930s and 1940s, due to heavy persecution. The remaining birds clung on in mid-Wales and with the cooperation of landowners and conservationists, kite numbers began to increase. By 1993, the Welsh population reached 100 pairs.

Red Kite moved to the BoCC4 Green List (species of least concern) in 2015 following further recovery in Wales and across the UK; the Welsh trend of 368% between 1995 and 2016 being evidence of this recovery.

FIRST GOOSE TREND

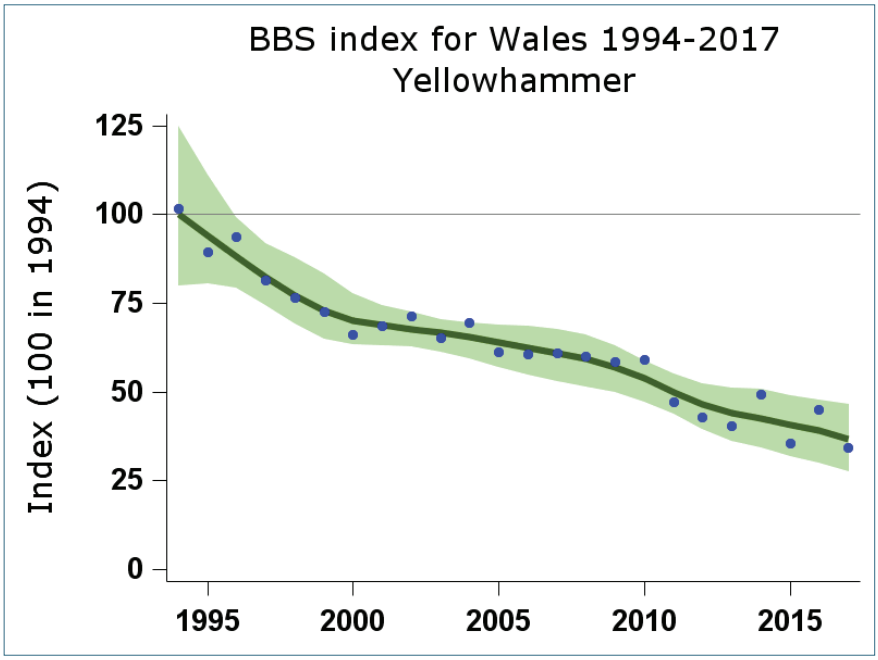
The second new trend to the Welsh set, **Canada Goose**, brings the long-term monitoring to 58 species and with a slight hint of slowing, **Canada Goose** increased by 432% long-term (1995–2016) and 56% since 2006.

First introduced to the UK in 1665 in England, the population has flourished, bringing with it economic and environmental challenges.

NO CHEESE

From 1995 to 2016, the **Yellowhammer** decline reached 58% in Wales. The national, long-term decline is largely thought to be due to changing farming practices, and factors such as a lack of winter stubble in which they forage in the depths of winter, and degradation of hedgerows have been suggested as reducing available foraging and nesting sites. Perhaps more relevant to Wales is a reduction in arable farmland, while agricultural 'improved' grassland may have reduced levels of invertebrate prey and weed seed density.

In more recent years, the BBS sample size for **Yellowhammer** has also declined, with the result that the reporting threshold for the new five- and 10-year trends is not met, raising concerns for the future monitoring of **Yellowhammer** in Wales.



CANADA GOOSE: EDMUND FELLOWES

RED KITE: JOHN HARDING

Table 6 Trends in Wales during 2016–17, 2006–16 and 1995–2016

Species	Min. sample	1-year (16–17)	10-year (06–16)	21-year (95–16)	LCL	UCL
Canada Goose	31	**-18**	**56** *	**432** *	210	1,150
Mallard	73	**25**	**2**	**-8**	-50	62
Pheasant	104	**18**	**8**	**52** *	12	99
(Grey Heron)	44	**68**	**-7**	**3**	-41	70
Red Kite	31	**10**	**123** *	**368** *	134	762
Buzzard	153	**10**	**-3**	**1**	-18	23
Curlew	32	**111** *	**-35** *	**-63** *	-77	-48
Feral Pigeon	38	**-9**	**15**	**48**	-5	132
Stock Dove	34	**-21**	**48** *	**61**	-8	166
Woodpigeon	205	**-1**	**-5**	**20** *	2	44
Collared Dove	79	**9**	**-22** *	**19**	-19	86
Cuckoo	61	**-23**	**7**	**-25**	-47	11
Swift	67	**16**	**-44** *	**-61** *	-73	-42
Gt Spotted Woodpecker	91	**-7**	**35** *	**180** *	112	276
Green Woodpecker	47	**-21**	**-11**	**-15**	-46	37
Jay	81	**6**	**4**	**31**	-8	79
Magpie	174	**2**	**-11** *	**-25** *	-34	-13
Jackdaw	152	**-8**	**-15**	**15**	-20	85
Rook	82	**-15**	**-40** *	**-52** *	-68	-36
Carrion Crow	221	**-2**	**-6**	**8**	-8	28
Raven	101	**-6**	**-16**	**34**	-16	112
Coal Tit	80	**13**	**1**	**-27**	-47	2
Blue Tit	193	**-14** *	**-17** *	**0**	-12	15
Great Tit	185	**-19** *	**-14** *	**22** *	4	43
Skylark	110	**-12** *	**4**	**1**	-21	28
Swallow	187	**6**	**-16**	**24** *	3	53
House Martin	93	**14**	**-23**	**-5**	-33	29
Long-tailed Tit	67	**-2**	**17**	**33**	-1	87
Willow Warbler	170	**17** *	**18** *	**-9**	-26	5
Chiffchaff	157	**7**	**49** *	**74** *	43	102

Species	Min. sample	1-year (16–17)	10-year (06–16)	21-year (95–16)	LCL	UCL
Blackcap	139	**5**	**63** *	**139** *	94	198
Garden Warbler	60	**15**	**-1**	**-26**	-51	18
Whitethroat	91	**-8**	**0**	**-25** *	-40	-2
Goldcrest	91	**-4**	**18**	**-32**	-53	6
Wren	215	**-2**	**20** *	**36** *	25	54
Nuthatch	78	**-7**	**10**	**38** *	7	76
Treecreeper	44	**-17**	**25**	**35**	-6	110
Starling	82	**-2**	**-43** *	**-72** *	-80	-61
Blackbird	215	**10** *	**0**	**40** *	28	53
Song Thrush	181	**12**	**-2**	**35** *	16	53
Mistle Thrush	108	**-1**	**-8**	**-5**	-23	26
Robin	209	**2**	**6**	**19** *	6	29
Redstart	68	**-14**	**30** *	**22**	-3	60
Stonechat	42	**3**	**1**	**191** *	105	387
Wheatear	58	**-27**	**-17**	**-32** *	-51	-7
House Sparrow	137	**7**	**5**	**75** *	45	117
Dunnock	168	**1**	**2**	**37** *	14	67
Grey Wagtail	33	**41**	**17**			
Pied Wagtail	128	**-6**	**-7**	**7**	-10	33
Meadow Pipit	96	**-9**	**-3**	**2**	-18	28
Tree Pipit	36	**3**	**-5**	**-18**	-44	29
Chaffinch	214	**-12** *	**-20** *	**-23** *	-35	-12
Bullfinch	68	**33**	**6**	**6**	-15	35
Greenfinch	113	**-30** *	**-72** *	**-62** *	-73	-48
Linnet	99	**-13**	**4**	**-12**	-31	20
Lesser Redpoll	33	**49** *	**4**			
Goldfinch	144	**10**	**14**	**83** *	48	122
Siskin	32	**-35** *	**66** *	**80** *	1	221
Yellowhammer	33	**24**		**-58** *	-74	-38
Reed Bunting	30	**106** *	**20**	**49** *	1	135

INTERPRETING THE RESULTS: see page 13
TREND GRAPHS ONLINE: www.bto.org/bbs-graphs
TREND TABLES ONLINE: www.bto.org/bbs-tables

Northern Ireland – population trends

Bullfinch increased by 29% in Northern Ireland between 2006 and 2016

With the addition of Mallard, Sedge Warbler and Lesser Redpoll to the Northern Ireland population trends due to the new five- and 10-year trends, the total rises to 37 species monitored in Northern Ireland by the BBS. Due to the sample size, it is not possible to report a robust five-year trend for Skylark in Northern Ireland, but the 10-year and long-term trends remain.

STATISTICALLY SIGNIFICANT RESULTS

Period	No. species	Greatest change	
Long-term (95–16) increases	17	Blackcap:	1,460%
Long-term (95–16) declines	2	Greenfinch:	-65%
Short-term (16–17) increases	6	Pheasant	42%
Short-term (16–17) declines	1	Greenfinch:	-54%

COUNTING BULLFINCH

The BBS shows **Bullfinch** increases across the UK, and things are no different at the Northern Ireland scale for this largely sedentary species.

An increase in **Bullfinch** of 29% between 2006 and 2016 in Northern Ireland has been revealed by the new shorter-term trend calculations. The reasons behind this are unknown. The long-term monitoring, at a UK scale, show large fluctuations over the years.

GREEN, AMBER, RED?

On the UK's BoCC4 listing (used to colour code the trend table species), **Greenfinch** is on the Green List, but in Ireland a list has been created for the Republic of Ireland and Northern Ireland combined. On this list, the **Greenfinch** is Amber-listed; a species of medium conservation concern.

With a long-term decline of 65% (1995–2016), shorter-term declines of 80% (2006–16), 57% (2011–16) and a one-year decline of 54% in Northern Ireland and the declines reported across the UK as a whole, the next BoCC assessment seems likely to bring a change of status of **Greenfinch** in the UK.

Since 2005 **Greenfinch** have been hit hard by the parasite Trichomonosis which affects the digestive tract, leading to death. Trichomonosis does not just affect **Greenfinch**, but may have impacts on other species it has been detected in, such as **Collared Dove**, **Turtle Dove** and **Sparrowhawk**.

Despite this, **Collared Dove**, for which there is a Northern Ireland-specific trend, shows a long-term increase of 95% (1995–2016) having been recorded breeding in Northern Ireland since the early 1960s.

BULLFINCH: JILL PAKENHAM

FIND OUT MORE...

Colhoun, K., & Cummins, S. 2013. Birds of Conservation Concern in Ireland 2014–2019. ***Irish Birds*** 9: 523–544.

Eaton, M.A., Aebischer, N.J., Brown, A.F., Hearn, R.D., Lock, L., Musgrove, A.J., Noble, D.G., Stroud, D.A. & Gregory, R.D. 2015. Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. ***British Birds*** 108: 708–746. (www.britishbirds.co.uk/wp-content/uploads/2014/07/BoCC4.pdf).

INTERPRETING THE RESULTS: see page 13

Table 7 Trends in Northern Ireland during 2016–17, 2006–16 and 1995–2016

Species	Min. sample	1-year (16–17)	10-year (06–16)	21-year (95–16)	LCL	UCL
Mallard	38	-9	16			
Pheasant	43	42 *	-11	104 *	22	292
Buzzard	33	3	36 *	1,195 *	479	3,116
Woodpigeon	86	15	14 *	90 *	47	151
Collared Dove	35	17	23	95 *	19	391
Magpie	84	9	-14	2	-23	35
Jackdaw	77	14	32 *	78 *	40	151
Rook	74	15	-22	-18	-47	13
Hooded Crow	83	23	54 *	178 *	103	287
Coal Tit	65	-2	-22 *	29	-7	93
Blue Tit	78	-12	-14 *	7	-24	43
Great Tit	75	5	12	140 *	87	201
Skylark	30	5	-28 *	-47 *	-62	-35
Swallow	85	11	-29 *	-6	-35	35
House Martin	46	4	40 *	107 *	10	267
Willow Warbler	81	-1	25 *	60 *	28	102
Chiffchaff	36	9	39 *	9	-20	56
Sedge Warbler	34	22	-43 *			
Blackcap	42	20 *	225 *	1,460 *	1,001	3,030
Goldcrest	46	39 *	-30	31	-16	96
Wren	93	8 *	8	76 *	25	130
Starling	80	14	-13	29	-11	92
Blackbird	88	15 *	0	38 *	5	72
Song Thrush	79	14	3	60 *	22	116
Mistle Thrush	59	-2	-25 *	-9	-59	82
Robin	90	4	8	24	-3	48
House Sparrow	57	2	12	36	-23	186
Dunnock	71	-2	-4	70 *	9	147
Pied Wagtail	48	-3	22	65 *	18	186
Meadow Pipit	63	5	-10	25	-7	78
Chaffinch	92	-3	0	38 *	7	63
Bullfinch	34	40 *	29 *	30	-15	80
Greenfinch	46	-54 *	-80 *	-65 *	-80	-27
Linnet	36	-25	-44 *	-12	-47	50
Lesser Redpoll	36	37	-43 *			
Goldfinch	52	20	40 *	446 *	221	1,060
Reed Bunting	32	5	-23	-16	-43	60

Channel Islands and the Isle of Man

Data collected on the Channel Islands and Isle of Man are used in the calculation of the UK population trends and contribute an impressive 31 squares in total.

Channel Islands

In 2017, the Channel Islands achieved an all-time coverage high of 28 squares. An impressive 84 species were counted, of which 68 were 'BBS' trend species, from the numerous **Carrion Crow** of which 829 were counted, through to a single **Curlew**. It is thanks to the 24 volunteers and dedicated Regional Organisers that this record coverage was possible in 2017.

Isle of Man

The efforts of two volunteers on the Isle of Man resulted in 41 bird species being counted during the BBS season, including eight **Chough**. Totals varied from 114 **Herring Gull** and 104 **Jackdaw** through to singles of **Whitethroat** and **Wheatear**. All records are of value for research projects, and counts of the 36 'BBS' species have been used in the UK population trends.

SHORT-TOED TREECREEPER: JEFF & ALLISON KEW, CHOUGH: JILL PAKENHAM

English regions – population trends

482 trends calculated in English Regions

The threshold for reporting trends for an English Region is 30 squares per year, on average, since the survey began. Regional population trends have been calculated for 79 species, for English regions where sample size allows robust calculations to be produced.

Long-term trends (1995–2016) are provided in Table 9, along with an indication of whether the trend is statistically significant, along with the average sample size for the species in a given region since the survey began. For more information on thresholds and statistical significance, see page 13.

Information on the trends and statistically significant results for each region is summarised here. In future, as coverage increases, it is an aim to be in a position to report regional trends for other countries within the UK.

In England, regional differences can be seen throughout the table, for example **Chiffchaff** increases range from 44% in the South West to 432% in the East Midlands between 1995 and 2016.

For other species, population change by region is more uniform: **Starling** has declined by between 73% in the South West and 43% in the East Midlands between 1995 and 2016.

Several regions are alone within the UK for being able to report trends for a given species. Often the locations for the species reaching the threshold are not altogether surprising. These include **Shelduck** and **Corn Bunting** in the East of England, **Red Grouse** and **Snipe** in Yorkshire, **Tufted Duck** and **Red Kite** in the South East and **Raven** and **Grey Wagtail** in the South West.

NORTH WEST

Fifty-seven trends calculated, 31 were significant: 21 increases and 10 declines. **Chiffchaff** increased by 388% and **Swift** declined by 61%.

NORTH EAST

Thirty-six trends calculated, 14 were significant: 7 increases and 7 declines. **Chiffchaff** increased by 326% and **Swift** declined by 66%.

YORKSHIRE

Fifty-five trends calculated, 32 were significant: 21 increases and 11 declines. **Greylag Goose** increased by 887% and **Grey Partridge** declined by 70%.

EAST MIDLANDS

Fifty-seven trends calculated, 29 were significant: 21 increases and 8 declines. **Buzzard** increased by 1,818% and **Cuckoo** declined by 84%.

EAST OF ENGLAND

Sixty-eight trends calculated, 41 were significant: 21 increases and 20 declines. **Buzzard** increased by 21,096% and **Turtle Dove** declined by 94%.

WEST MIDLANDS

Fifty-three trends calculated, 34 were significant: 21 increases and 13 declines. **Goldfinch** increased by 243% and **Cuckoo** declined by 75%.

SOUTH EAST

Sixty-eight trends calculated, 44 were significant: 20 increases and 24 declines. **Red Kite** increased by 16,502% and **Turtle Dove** declined by 95%.

SOUTH WEST

Sixty-one trends calculated, 31 were significant: 19 increases and 12 declines. **Canada Goose** increased by 131% and **Cuckoo** declined by 81%.

LONDON

Twenty-seven trends calculated, of which 23 were significant: 15 increases and 8 declines. **Ring-necked Parakeet** increased by 26,519% and **House Sparrow** declined by 71%.

Table 8 Counties in each region and squares covered in 2017

	Region	Counties	Squares covered in 2017
1	North West	Cheshire, Cumbria, Lancashire, Greater Manchester, Merseyside	273
2	North East	Cleveland, County Durham, Northumberland	127
3	Yorkshire & Humber	East Yorkshire, North Lincolnshire, North Yorkshire, South Yorkshire, West Yorkshire	302
4	East Midlands	Derbyshire, Northamptonshire, Leicestershire & Rutland, Lincolnshire, Nottinghamshire	299
5	East of England	Bedfordshire, Cambridgeshire, Essex, Hertfordshire, Norfolk, Suffolk	405
6	West Midlands	Birmingham, Herefordshire, Shropshire, Staffordshire, Warwickshire, Worcestershire	224
7	South East	Berkshire, Buckinghamshire, Hampshire, Isle of Wight, Kent, Oxfordshire, Surrey, Sussex	673
8	South West	Avon, Cornwall, Devon, Dorset, Gloucestershire, Somerset, Wiltshire	513
9	London	Greater London	110

FIND OUT MORE...

English regions:
More detailed information is available on the BBS webpages under 'Latest Results', including short-term trends (2016–17) and trend graphs.

(www.bto.org/bbs)

Table 9 Trends in English regions during 1995–2016

Species	North West		North East		Yorkshire		East Midlands		East of England		West Midlands		South East		South West		London	
	95–16	Sample	95–16	Sample	95–16	Sample	95–16	Sample	95–16	Sample	95–16	Sample	95–16	Sample	95–16	Sample	95–16	Sample
Canada Goose	**140** *	72			**117** *	33	**38**	44	**52**	60	**7**	72	**43**	122	**131** *	51		
Greylag Goose					**887** *	40	**694** *	31	**97** *	48			**104** *	39				
Mute Swan									**58**	43			**-13**	58	**45**	37		
Shelduck									**4**	36								
Mallard	**21**	161	**69** *	34	**31** *	107	**20**	109	**-1**	194	**85** *	120	**29**	242	**36** *	158	**-19**	43
Tufted Duck													**67**	31				
Red Grouse					**18**	51												
Red-legged Partridge					**17**	53	**-50** *	78	**-17**	181	**16**	36	**92** *	125	**123** *	60		
Grey Partridge					**-70** *	30	**-31**	32	**-55** *	43			**-80** *	30				
Pheasant	**155** *	146	**26**	72	**68** *	152	**1**	159	**-14** *	281	**65** *	143	**24** *	399	**61** *	282		
(Grey Heron)	**-28** *	80			**-10**	36	**-17**	52	**-44** *	82	**1**	59	**-19**	126	**-13**	83		
(Cormorant)									**-15**	49			**49**	50	**-26**	33		
Sparrowhawk	**-45** *	33							**-26**	47			**-26** *	67	**-12**	49		
Red Kite													**16,502***	73				
Buzzard	**106** *	78			**591** *	39	**1,818***	60	**21,096***	71	**199** *	101	**1,104***	175	**19**	232		
Moorhen	**-7**	70			**20**	40	**-29** *	61	**-17**	126	**-21**	61	**-33** *	145	**-7**	69		
Coot	**-7**	31							**-12**	39	**99**	31	**14**	66				
Oystercatcher	**0**	61			**255** *	49			**76** *	34								
Lapwing	**-27** *	116	**-17**	47	**5**	111	**-29**	63	**-32** *	75	**-32**	40	**-57** *	102				
Curlew	**-49** *	92	**-31** *	50	**8**	115												
Snipe					**162**	39												
Feral Pigeon	**-36** *	76			**-50** *	61	**-44**	50	**-34** *	76	**-39**	43	**-25**	110	**-35**	68	**-23** *	74
Stock Dove	**72** *	59			**55** *	56	**-10**	78	**-3**	146	**72** *	87	**42** *	208	**31** *	131		
Woodpigeon	**81** *	221	**18**	85	**86** *	175	**27**	198	**28** *	327	**24** *	185	**20** *	497	**50** *	357	**47** *	83
Turtle Dove									**-94** *	59			**-95** *	42				
Collared Dove	**13**	134	**-15**	33	**-27** *	82	**29**	112	**44** *	211	**-34** *	117	**-4**	299	**-1**	195	**-13**	53
Cuckoo	**-39**	33			**-54** *	44	**-84** *	48	**-74** *	105	**-75** *	52	**-73** *	160	**-81** *	73		
Swift	**-61** *	108	**-66** *	32	**-45** *	86	**0**	82	**-37** *	151	**-53** *	75	**-57** *	171	**-60** *	143	**-58** *	59
Gt Spotted Woodpecker	**101** *	90			**77** *	51	**152** *	64	**61** *	151	**143** *	110	**75** *	316	**125** *	170	**40** *	38
Green Woodpecker							**205** *	49	**109** *	173	**52** *	66	**21** *	315	**1**	132	**41** *	32
Kestrel	**-36** *	71			**-42** *	61	**15**	67	**-6**	111	**-35** *	42	**-31** *	136	**-47** *	78		
Ring-necked Parakeet													**548** *	33			**26,519***	44
Jay	**31**	71					**3**	32	**22**	119	**-21** *	63	**-11**	239	**-5**	111	**-19**	40
Magpie	**-11**	187	**-15**	36	**-24** *	102	**35**	149	**28** *	247	**-10**	164	**6**	424	**-8**	296	**34** *	82
Jackdaw	**71** *	147	**-1**	63	**61** *	122	**146** *	126	**125** *	228	**94** *	142	**73** *	381	**46** *	280		
Rook	**-29**	91	**-24**	49	**-23**	112	**5**	100	**12**	181	**-7**	88	**1**	256	**-25** *	223		
Carrion Crow	**48** *	229	**-5**	83	**40** *	180	**40** *	186	**85** *	305	**9**	183	**23** *	481	**15**	352	**46** *	83
Raven															**36**	75		
Coal Tit	**48** *	73	**33**	42	**41**	46	**18**	40	**2**	66	**37** *	51	**-3**	154	**6**	104		
Marsh Tit													**-42** *	52	**-13**	30		
Blue Tit	**-11**	207	**-15**	65	**-8**	154	**26** *	182	**19** *	306	**-11**	183	**-10** *	484	**-11**	340	**6**	82
Great Tit	**27** *	194	**63** *	58	**46** *	136	**38** *	171	**12**	290	**10**	178	**7**	471	**32** *	329	**101** *	77
Skylark	**-23**	122	**-24** *	71	**4**	153	**-20**	160	**-28** *	280	**-21** *	117	**-29** *	318	**-30** *	224		
Swallow	**-5**	201	**-2**	76	**-6**	163	**81** *	154	**4**	229	**-3**	147	**17**	327	**27** *	304		
House Martin	**10**	100			**8**	69	**89**	59	**-37** *	99	**-44** *	82	**-57** *	146	**-27** *	151		
Long-tailed Tit	**24**	87			**29**	53	**72** *	82	**30** *	156	**-12**	90	**-14**	250	**40** *	153	**80** *	34
Willow Warbler	**5**	150	**-28**	69	**-1**	120	**-54** *	94	**-80** *	113	**-53** *	91	**-76** *	152	**-60** *	154		
Chiffchaff	**388** *	109	**326** *	44	**336** *	82	**432** *	107	**160** *	214	**172** *	146	**71** *	384	**44** *	300	**162** *	34
Sedge Warbler									**-26**	46			**-6**	34	**-3**	34		
Reed Warbler									**5**	41			**-21**	34				
Blackcap	**205** *	121	**50** *	42	**126** *	94	**117** *	126	**98** *	247	**117** *	141	**106** *	399	**120** *	284	**181** *	47
Garden Warbler	**-26**	30					**-39**	33	**-36** *	59	**-27** *	45	**-38** *	99	**-23**	63		
Lesser Whitethroat							**8**	36	**26**	76	**55** *	30	**-29**	57	**-16**	42		
Whitethroat	**15**	90	**43**	41	**11**	85	**90** *	140	**11**	253	**23** *	109	**46** *	303	**17**	213		
Goldcrest	**96** *	48	**101**	30			**98** *	31	**82** *	78	**128** *	48	**49** *	203	**-7**	135		
Wren	**70** *	219	**47** *	79	**54** *	180	**45** *	188	**37** *	302	**36** *	180	**16** *	475	**17** *	348	**44** *	77
Nuthatch	**234** *	45							**131** *	32	**121** *	53	**49** *	192	**61** *	88		
Treecreeper									**-4**	30			**-2**	96	**3**	51		
Starling	**-54** *	175	**-46** *	60	**-61** *	124	**-43** *	133	**-52** *	231	**-67** *	131	**-65** *	335	**-73** *	194	**-59** *	80
Blackbird	**45** *	219	**22**	74	**52** *	172	**40** *	195	**5**	319	**35** *	186	**3**	496	**21** *	358	**-30** *	83
Song Thrush	**68** *	169	**13**	64	**97** *	119	**47** *	142	**7**	242	**105** *	157	**-2**	432	**22** *	299	**-32** *	51
Mistle Thrush	**-13**	121	**-3**	40	**-21** *	83	**7**	85	**-52** *	134	**-10**	89	**-55** *	228	**-45** *	128	**-55** *	34
Robin	**45** *	210	**59** *	72	**75** *	152	**40** *	183	**32** *	300	**52** *	183	**18** *	481	**19** *	345	**90** *	80
Wheatear	**-32**	53			**-7**	48												
House Sparrow	**-11**	161	**-28**	44	**-7**	100	**9**	123	**-29** *	197	**-7**	144	**-29** *	308	**7**	238	**-71** *	70
Tree Sparrow	**82** *	31			**214** *	42	**22**	34										
Dunnock	**25** *	183	**31**	60	**6**	131	**11**	173	**26** *	276	**34** *	169	**7**	429	**17**	317	**30** *	63
Yellow Wagtail							**-44** *	38	**-38** *	49								
Grey Wagtail															**-20**	32		
Pied Wagtail	**-11**	132	**17**	49	**5**	107	**-17**	98	**8**	153	**9**	88	**-14** *	204	**-2**	155		
Meadow Pipit	**-2**	92	**-8**	55	**18**	106	**-47** *	41	**-52** *	42			**-47** *	49	**-17**	49		
Chaffinch	**-8**	219	**6**	83	**25**	178	**16** *	193	**0**	319	**-39** *	181	**-25** *	483	**-22** *	352	**71** *	57
Bullfinch	**-13**	43					**44**	53	**-7**	66	**20**	56	**-18**	138	**8**	113		
Greenfinch	**-45** *	154	**-52** *	44	**-50** *	103	**-46** *	138	**-42** *	250	**-40** *	141	**-59** *	375	**-61** *	267	**-42** *	59
Linnet	**-18**	94	**-35** *	49	**-19**	97	**-19**	119	**-14**	175	**-18**	76	**-31** *	226	**-11**	184		
Goldfinch	**158** *	169	**123** *	54	**156** *	126	**219** *	140	**94** *	219	**243** *	132	**89** *	339	**101** *	272	**450** *	52
Corn Bunting									**-37** *	39								
Yellowhammer	**-34** *	54	**-46** *	43	**-22** *	88	**0**	138	**-22** *	221	**-50** *	104	**-42** *	249	**-20** *	167		
Reed Bunting	**11**	66			**82** *	47	**49** *	64	**43** *	83			**-29** *	61	**37**	34		

INTERPRETING THE RESULTS: see page 13 **TREND GRAPHS ONLINE:** www.bto.org/bbs-graphs

Background, methods and recent papers

BACKGROUND AND METHODS

The BBS was launched, in 1994, to provide more representative habitat and geographical coverage than the main survey running at the time, the Common Birds Census (CBC). The CBC ended in 2000, and the overlap period between 1994 and 2000 allowed BTO to develop methods for calculating long-term trends (from the 1960s to the present) using information from both schemes.

The BBS is a line-transect survey based on randomly located 1-km squares. Squares are chosen through stratified random sampling, with more squares in areas with more potential volunteers. The difference in sampling densities is taken into account when calculating trends. BBS volunteers make two early-morning visits to their square during the April–June survey period, recording all birds encountered while walking two 1-km transects across their square. Each 1-km transect is divided into five 200-m sections for ease of recording. Birds are recorded in three distance categories, or as 'in flight', in order to assess detectability and work out species density. To assess further the detectability of species the option of recording how birds were first detected (by song, call or visually) was introduced in 2014. Observers also record the habitat along the transects, and record any mammals seen during the survey. Surveying a BBS square involves around six hours of fieldwork per year, and the aim is for each volunteer to survey the same square (or squares) every year.

As BBS squares are selected randomly, they can turn up within any kind of habitat. Some squares can never be surveyed, and these truly 'uncoverable' sites are removed from the system. However, squares that are temporarily inaccessible, or which are not taken up due to their remote location, are retained in order to maintain the integrity of the sampling design.

The BBS National Organiser, based at BTO HQ, is responsible for the overall running of the scheme, and is the main point of contact for the network of volunteer Regional Organisers (ROs). ROs are responsible for finding new volunteers and allocating squares to observers in their region. At the end of the season they validate submissions made online, and collect paper submissions and return them to BTO HQ. We are very grateful for the assistance of the ROs.

The BBS provides reliable population trends for a large proportion of our breeding species. Trends can also be produced for specific countries, regions or habitats. For these analyses, we take the higher count from the two visits for each species, summed over all four distance categories and 10 transect sections. Only squares that have been surveyed in at least two years are included in the analyses. Population changes are estimated using a log-linear model with Poisson error terms. Counts are modelled as a function of year and site effects, weighted to account for differences in sampling densities across the UK, with standard errors adjusted for overdispersion.

Since 2009, data from additional randomly selected 1-km squares surveyed as part of the Scottish Woodland BBS and the Upland BBS have been included in the BBS sample. These squares were surveyed using the same methodology as standard BBS squares, and results were incorporated into trends accounting for additional sampling effort. Since 2010, the option of adding an Upland Adjacent square to an existing 'Eligible Upland' BBS square has been encouraged, with the aim of increasing coverage in upland areas. These data are treated separately during the analyses.

'Upland Rovers' was introduced in 2017, with the aim of further increasing coverage in remote areas. Carefully selected squares are available to be surveyed just once by 'roving' volunteers. These are 'core' BBS squares with poor to no previous coverage, upland in habitat type and remote as identified by a combination of distance from road and local human population.

Work has been carried out to assess the reliability of BBS trends, to ensure that reported trends are based on reliable data and sufficient sample sizes. This work has resulted in the following exclusions and caveats:

- We do not report population trends for five species of gull (Black-headed, Common, Lesser Black-backed, Herring and Great Black-backed), as a large proportion of the records are of non-breeding, wintering or migratory individuals.
- Trends for rare breeding species with substantial wintering populations (*e.g.* Fieldfare) are excluded.
- Trends for Cormorant, Grey Heron, Little Egret and Common Tern are reported with the caveat that counts may contain a high proportion of birds away from breeding sites.
- Trends for Tawny Owl and Barn Owl are reported with the caveat that the BBS monitors nocturnal species poorly.
- Counts for six wader species (Oystercatcher, Golden Plover, Lapwing, Snipe, Curlew and Redshank) are corrected to exclude counts from non-breeding flocks, and observations of Golden Plover in habitat unsuitable for breeding are also excluded.

COMMON TERN: ALLAN DREWITT

PUBLISHED AND FORTHCOMING PAPERS...

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Martay, B., Brewer, M.J., Elston, D.A., Bell, J.R., Harrington, R., Brereton, T.M., Barlow, K.E., Botham, M.S. & Pearce-Higgins, J.W. 2017. Impacts of climate change on national biodiversity population trends. ***Ecography*** 40: 1139–1151.

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Further reading

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Mammal monitoring and population trends

Red Fox declined by 41% in the UK between 1996 and 2016

Trends for nine mammal species – including trends for countries, English Regions and for the UK as a whole.

Of the 3,941 BBS squares surveyed in 2017, volunteers recorded mammal data on 3,567 (91%). Thanks to the efforts of these volunteers, population trends are calculated for nine of the UK's most easily detected and widespread terrestrial mammal species.

The option of recording live mammals and mammal presence during bird count visits and via additional visits and local knowledge, provides valuable data on mammal distribution and population change. In 2017, 54 trends were calculated for the nine mammal species monitored by the BBS. This is an increase of one as **Roe Deer** reached the reporting threshold in Yorkshire.

DATA TYPES

Live mammals, signs of presence, and local knowledge are all recorded during the season. Just as important are the submission of 'null returns' from squares where no mammals or evidence of presence was found, despite the volunteer looking.

Live mammals were counted on 2,974 squares during the bird surveys, 157 had indirect evidence only (local knowledge, field signs) and 436 squares had 'null returns' where no evidence of presence was established.

GREY AREA

Grey Squirrel is indicated as being stable by a 0% population change from 1996 to 2016 across the UK as a whole, but with country and regional trends it becomes obvious changes are not uniform across the UK.

Although neither are statistically significant, England mirrors little change in the population over time and Wales shows an 18% increase. At an English region scale, **Grey Squirrel** has undergone a statistically significant increase of 71% in the North West, a 29% decline in the West Midlands and a 40% increase in London.

BADGER: SARAH KELMAN

▲ Mammal data recorded during the BBS are not limited to species for which trends are calculated, thus providing a further valuable resource including 'presence' data and count information for trend and non-trend species.

Table 10 All mammal species recorded in 2017

Species	Squares recorded
Red-necked Wallaby	1
Red Squirrel	37
Grey Squirrel	1,207
Common Dormouse	2
Bank Vole	37
Short-tailed Vole	34
Water Vole	10
Harvest Mouse	1
Wood Mouse	36
House Mouse	6
Common Rat	62
Rabbit	1,942
Brown Hare	989
Mountain/Irish Hare	89
Hedgehog	55
Mole	582
Common Shrew	55
Pygmy Shrew	6
Water Shrew	1
Lesser White-toothed Shrew	1
Lesser Horseshoe Bat	1
Daubenton's Bat	2
Natterer's Bat	3
Noctule Bat	3
Common Pipistrelle	1
Soprano Pipistrelle	2
Pipistrelle Bat sp	13
Serotine	1
Wild Cat	1
Red Fox	514
Badger	312
Otter	21
Pine Marten	12
Stoat	48
Weasel	17
Polecat	2
American Mink	6
Common Seal	5
Grey Seal	10
Wild Boar	5
Reeves's Muntjac	218
Red Deer	133
Sika Deer	17
Fallow Deer	116
Roe Deer	830
Chinese Water Deer	13
Feral Goat	15
Park Cattle	6
Harbour Porpoise	1
Minke Whale	1

Table 10 'Squares recorded' are the number of squares on which species were recorded. These include counts of live mammals, field signs, dead mammals and local knowledge.

It is a non-native species, introduced to Britain from North America in the 1870s. The species is known to spread the disease squirrel-pox to native **Red Squirrels**, occasionally preys on chicks and eggs and can be a pest species within forestry plantations.

The BBS not only monitors the population changes of **Grey Squirrel** across the UK, but can provide data from the survey for use in research, for example, looking into whether or not the presence of **Grey Squirrel** in English woodlands has an impact on the resident bird species.

GREY SQUIRREL: AMY LEWIS

FIND OUT MORE...

Newson, S.E., Leech, D.I., Hewson, C.M., Crick, H.Q.P. & Grice, P.V. 2010. Potential impact of Grey Squirrels *Sciurus carolinensis* on woodland bird populations in England. ***Journal of Ornithology*** doi: 10.1007/s10336-009-0445-8.

Table 11 Mammal trends in **UK** during 1996–2016

Species	*Scientific name*	Sample	96–16	LCL	UCL
Grey Squirrel	*Sciurus carolinensis*	756	**0**	-8	10
Rabbit	*Oryctolagus cuniculus*	1,436	**-60** *	-67	-52
Brown Hare	*Lepus europaeus*	718	**-9**	-20	1
Mountain/Irish Hare	*Lepus timidus*	52	**-37**	-61	10
Red Fox	*Vulpes vulpes*	284	**-41** *	-50	-30
Reeves' Muntjac	*Muntiacus reevesi*	99	**117** *	56	244
Red Deer	*Cervus elaphus*	65	**9**	-10	26
Fallow Deer	*Dama dama*	63	**14**	-3	37
Roe Deer	*Capreolus capreolus*	434	**81** *	58	114

Table 12 Mammal trends in **England** during 1996–2016

Species	*Scientific name*	Sample	96–16	LCL	UCL
Grey Squirrel	*Sciurus carolinensis*	675	**-1**	-11	11
Rabbit	*Oryctolagus cuniculus*	1,177	**-44** *	-51	-35
Brown Hare	*Lepus europaeus*	613	**-8**	-17	1
Red Fox	*Vulpes vulpes*	230	**-45** *	-55	-35
Reeves' Muntjac	*Muntiacus reevesi*	99	**117** *	49	229
Fallow Deer	*Dama dama*	59	**15**	-4	37
Roe Deer	*Capreolus capreolus*	335	**68** *	40	104

Table 13 Mammal trends in **Scotland** during 1996–2016

Species	*Scientific name*	Sample	96–16	LCL	UCL
Rabbit	*Oryctolagus cuniculus*	115	**-82** *	-90	-72
Brown Hare	*Lepus europaeus*	78	**-16**	-45	16
Red Deer	*Cervus elaphus*	45	**-7**	-29	41
Roe Deer	*Capreolus capreolus*	98	**98** *	45	149

Table 14 Mammal trends in **Wales** during 1996–2016

Species	*Scientific name*	Sample	96–16	LCL	UCL
Grey Squirrel	*Sciurus carolinensis*	57	**18**	-15	63
Rabbit	*Oryctolagus cuniculus*	94	**-48** *	-66	-9

Table 15 Mammal trends in **Northern Ireland** during 1996–2016

Species	*Scientific name*	Sample	96–16	LCL	UCL
Rabbit	*Oryctolagus cuniculus*	45	**-38** *	-63	-5

MAMMAL TREND GRAPHS ONLINE:
www.bto.org/bbs-mammals

Table 16 Mammal trends in **English Regions** during 1996–2016

Species	North West		North East		Yorkshire		East Midlands		East of England		West Midlands		South East		South West		London	
	96–16	Sample	96–16	Sample	96–16	Sample	96–16	Sample	96–16	Sample	96–16	Sample	96–16	Sample	96–16	Sample	96–16	Sample
Grey Squirrel	**71** *	59			**-28**	33	**31**	46	**-7**	100	**-29** *	75	**-14**	203	**24**	101	**40** *	51
Rabbit	**-33**	110	**-69** *	40	**-10**	116	**-87** *	111	**-43** *	206	**-50** *	111	**-62** *	292	**-27**	181		
Brown Hare	**-43** *	62			**-2**	73	**31** *	91	**-2**	146	**-24**	41	**-27** *	101	**-11**	71		
Red Fox									**-19**	31			**-32** *	65	**-46** *	46		
Reeves' Muntjac									**119** *	47			**64** *	33				
Roe Deer					**135** *	31							**79** *	120	**47** *	101		

- Trends are expressed as the percentage change, and marked with an asterisk (*) where the 95% confidence limits of the change do not overlap zero (indicating that there has been a significant change).
- Trends for Red and Fallow Deer are reported with caveats. These are herding species and trends should be interpreted with caution, the presence or absence of a herd in a given BBS visit could influence the overall trend.
- The sample is the mean number of squares per year on which the species was recorded during 1995–2017.
- The trend since the start of the survey, covering the years 1995–2017, has been smoothed, and the end years truncated (figure in bold).
- LCL and UCL are the lower and upper 95% confidence limits for the 1996–2016 trend (displayed in Tables 11–15).

WBBS: BBS-style transects along waterways

The Waterways Breeding Bird Survey was previously managed and funded by BTO, with the financial assistance of the Environment Agency. Today, this survey is part of the BTO/JNCC/RSPB Breeding Bird Survey agreement.

The Waterways Breeding Bird Survey (WBBS) has now been running for 20 years. To mark the occasion, an overview and history of the survey can be found on pages 32–33. It is with thanks to all the volunteers who have contributed to the survey over years that it is now possible to report trends for 24 waterway specialists in this report.

With WBBS coverage reaching 300 stretches and volunteers keen to take part, the next aim for the survey is to create more randomly allocated stretches to allow this coverage to grow, a task on the top of the WBBS To-Do list.

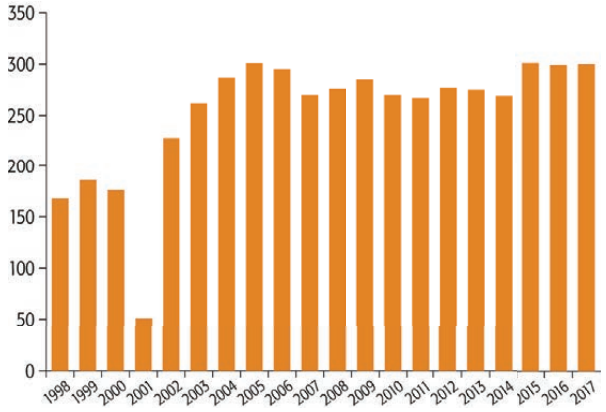
CONTRIBUTIONS

Online data entry is encouraged, but data are gratefully received on paper as well. All data should be with BTO HQ by the end of August to allow for checking, analysis and prompt reporting the following year. In 2017, 90% of all data from WBBS stretches were entered online.

As with BBS, mammal recording also takes place on WBBS bird counts. In 2017, 30 mammal species were recorded during the season.

▲ A first-time WBBS surveyor ventured out in 2017 and got a few surprises along the way! Share your WBBS news and photos on Twitter using the hashtag #_WBBS and tagging @BBS_birds.

Figure 4 Coverage of WBBS stretches (1998–2017).



2001 – foot-and-mouth disease

METHOD AND PURPOSE

Methods are similar to the Breeding Bird Survey, but there are some differences. Rather than two 1-km long parallel transect routes, divided into 200-m sections, the WBBS runs as one long transect, alongside a waterway, and with sections being 500-m long. Each WBBS stretch can range in length from a single 500-m section to a 5-km stretch.

The survey is especially valuable for monitoring the population trends of species strongly associated with linear waterways, such as **Goosander**, **Common Sandpiper**, **Dipper** and **Grey Wagtail**.

DIPPER: EDMUND FELLOWES

COVERAGE

Since the survey started in 1998, 565 individual WBBS stretches have been surveyed. Here, the distribution of the 300 stretches covered by 262 volunteers in 2017 is illustrated.

This total shows coverage stability over time, rather than growth. However, it is not currently possible to randomly select new WBBS stretches for allocation (for technical reasons) and the survey coverage remains in a healthy position.

During the 2017 survey, 168 bird species were counted along these linear waterways. From the most numerous species, Woodpigeon, to the scarcer sightings such as Crane and Ring-necked Duck.

WBBS SPECIES

Of the 24 species for which WBBS trends are produced annually, Mallard was the most numerous species with 8,588 counted during surveys.

For some species, the current average number of sites they were counted on is below the reporting threshold (Table 17). With increases in a combination of coverage or species distribution and numbers, it may be possible to report trends for these species in the future.

Species	Sample
Shelduck	26
Redshank	22
Mandarin	23
Great Crested Grebe	21
Snipe	21
Gadwall	21
Little Grebe	17
Marsh Tit	14

Table 17 Additional species of interest for WBBS but for which sample size is currently just too low to calculate robust trends from the survey.

Two decades of WBBS

Celebrating 20 years of WBBS

In 1998, the Waterways Breeding Bird Survey was launched. Here, we take a look back through the last twenty years.

By **David Noble**, Principal Ecologist, BTO

The Waterways Breeding Bird Survey (WBBS) was first introduced to the BTO volunteer network in 1998. At that time, the Common Birds Census (CBC) was close to its final years of operation, having been effectively replaced by the Breeding Bird Survey. The WBBS was designed to do several things.

RATIONALE

First, it would provide a BBS-like continuation of the Waterways Bird Survey (WBS), a territory mapping survey similar to the CBC but along waterways, to allow long-term continuation of the population trends for the approximately 25 riparian species monitored best by the WBS. By using counts of birds during two breeding season visits to the site, it would be possible to analyse trends in abundance without having to carry out territory mapping.

Second, through the use of random site selection, the WBBS was designed to ensure that the trends for these riparian species were representative of this habitat.

Third, the information was intended to be used by the Environment Agency – its main funder at the time – by building in the opportunity to link WBBS stretches directly with river stretches also surveyed for the River Habitat Survey (RHS). RHS sites are surveyed by Environment Agency staff and include information on waterway type, substrate, flow, man-made structures and other water quality parameters. This was considered to be potentially useful information for interpreting the temporal and spatial patterns of abundance in riverine birds.

DECISIONS

A number of significant decisions were made at this time. To duplicate the BBS as closely as possible, but along waterways, the WBBS sites were divided into up to 10 sections of 500-m (instead of 200-m) and also recorded in distance bands. Counts of birds and adjacent habitats were recorded at this level of resolution, the habitat recording almost identical to those used in BBS but including additional information on the waterway itself. The other decision was for observers to record all bird species – and later also mammals – rather than only riparian species monitored by the WBS. The rationale for this was that for little additional effort by the observer, it would be possible to generate waterway-specific trends for a wide range of species for comparison with other habitat-specific trends (such as farmland or woodland) calculated periodically from BBS.

GROWTH AND FURTHER DEVELOPMENTS

Since its inception, the WBBS has grown slowly to an impressive 300 sites, and annual results, eventually comprising WBBS population trends, were provided to participants in an annual newsletter. After about eight years of operation during which time the WBS was also continuing, the BTO undertook analyses to compare WBBS trends to those derived from the WBS. The finding that population trends for the 25 riparian species did not significantly differ between the two surveys over this time period provided the justification to start generating long-term trends using both data-sets, the WBS from 1974 to 2006 and the WBBS from 1998 to the present for dissemination in the annual Bird Trends report on the BTO website and for use in conservation assessments such as Red Lists.

The mid-2000s also saw the development of bespoke riverine bird indicators for use by the UK and England governments. Together with the Environment Agency, the BTO evaluated the importance of different types of water-bodies (*e.g.* fast-flowing streams, wet meadows, ponds and standing water) to a range of waterway and

wetland birds and constructed new bird indicators from population trends from species strongly associated with those habitats (Everard & Noble 2010). These indicators, largely based on WBBS and WBS data, remain an important component of the official Biodiversity Indicator suite.

Early on, concerted attempts were made to obtain RHS survey data from as many 500-m stretches on different WBBS sites as possible. These were subsequently analysed along with the bird count data to show the relationship between the abundance of riverine birds, and RHS-derived features of the waterway for example stream flow rate, or the presence of man-made structures such as bridges for species like Grey Wagtail. The results of that study were published (Vaughan *et al.* 2007) but partly due to changes in the way that RHS is operated, aiming for new sites rather than repeat surveys, the relationship with RHS variables has not been further explored.

It is also possible to use novel external sources of environmental information to interpret patterns of bird abundance on WBBS sites. Between 2012 and 2015, Birmingham University student Alex Royan led on a series of papers relating patterns of occurrence in riverine birds to measures of river flow obtained from the national dataset. His work demonstrated the importance of both magnitude and variability in river flow in providing suitable substrate for feeding, but also the potential negative effects of extreme flow events such as floods and droughts on species that breed or forage along rivers, such as Dipper and Common Sandpiper (*e.g.* Royan *et al.* 2015). The prospects of further research to explain patterns of riverine bird abundance, particularly in light of worrying declines in many species, are wide open.

THANKS

It is thanks to the dedication of hundreds of volunteers who have taken part in this survey over the years that the collection of these data, and the associated research, has even been possible. For this, we owe huge thanks to all who have taken part, so far!

Thanks are also due to the Environment Agency for their financial contributions to the survey during its infancy, without which, this survey may not even exist today!

KINGFISHER: SARAH KELMAN

FIND OUT MORE...

Everard, M. & Noble, D. 2010. The development of bird indicators for British freshwaters and wetlands. ***Aquatic Conservation - Marine and Freshwater Ecosystems*** 20: 117–124 doi:10.1002/aqc.1074.

Royan, A., Prudhomme, C., Hannah, D.M., Reynolds, S.J., Noble, D.G., & Sadler, J.P. 2015. Climate-induced changes in river flow regimes will alter future bird distributions. ***Ecosphere 6*** doi: 10.1890/ES14-00245.1.

Vaughan, I.P., Noble, D.G. & Ormerod, S.J. 2007. Combining surveys of river habitats and river birds to appraise riverine hydromorphology. ***Freshwater Biology*** 52: 2 270–2 284 doi: 10.1111/j.1365-2427.2007.01837.x.

United Kingdom – WBBS population trends

Goosander increased by 41% along UK waterways between 2006 and 2016

Trends for a selection of 24 species associated with waterways. For all these species, it is also possible to produce shorter-term (five- and 10-year) trends, along with the one-year trends. These trends provide an indication of the health of bird populations in this habitat type in particular, rather than for all UK habitat types overall, as is the case for the standard Breeding Bird Survey trends. The addition of shorter-term trends provide an insight into population changes through time along linear waterways.

STATISTICALLY SIGNIFICANT RESULTS

Period	No. species	Greatest change	
Long-term (99–16) increases	1	Whitethroat:	20%
Long-term (99–16) declines	8	Lapwing:	-55%

Of the 24 long-term (1999–2016) trends produced in 2017, nine were statistically significant. Eleven of the 10-year trends were statistically significant but none of the one-year trends were. These trends are still valuable and an indication of change, but are not as robust as those indicated as 'statistically significant'.

Eight of the nine statistically significant changes recorded in the long-term trends were declines, as were 10 of the 11 statistically significant 10-year trends.

WHITETHROAT INCREASE

In contrast to many of the trends produced by the WBBS, **Whitethroat** has increased by 20% between 1999 and 2016 along riverine habitats.

This trend is echoed by the BBS, where an increase of 27% across all habitat types has been recorded between 1995 and 2016.

Evidence suggests that during the 1968–69 winter, drought in **Whitethroat** wintering grounds just south of the Sahara Desert, was a factor in the 70% population crash recorded in the UK between the 1968 and 1969 breeding seasons. Since then, further research has also supported this theory by showing the correlation between Sahel rainfall and overwinter survival of **Whitethroat**.

Rainfall is important as it promotes greater invertebrate abundance, a valuable prey resource for **Whitethroat** over the winter period.

Overall, since the 1968–69 crash, the population has been recovering, resulting in the net increase witnessed during the WBBS monitoring period.

GOOSANDER ARE GO!

Having first colonised the UK in Perthshire from Scandinavia in 1871, range expansion has been vast.

Goosander now inhabit Wales, England, including the south-west, and although not proven to breed, have been seen in suitable breeding habitat in Northern Ireland.

Over the last 10 years (2006–16) in the UK, **Goosander** has undergone an increase of 41% along its favoured habitat: linear waterways.

The reason behind the range expansion is unknown, but in the UK, the species is thriving and this has given rise to some conflict with anglers.

FIND OUT MORE...

Winstanley, D., Spencer, R. & Williamson, K. 1974. Where have all the Whitethroats gone? ***Bird Study*** 21: 1–14.

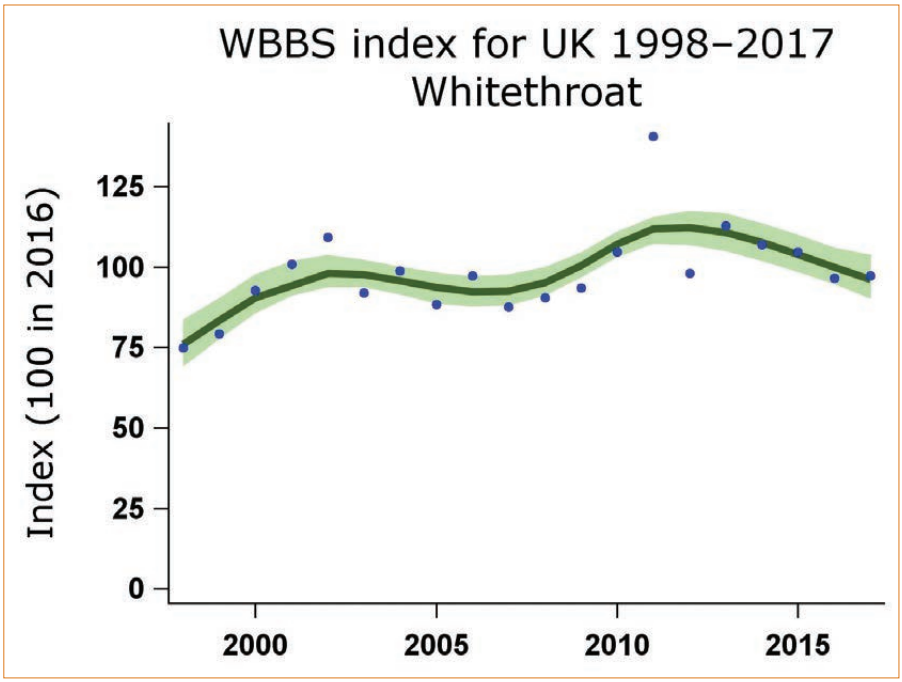


Table 18 WBBS UK population trends during 2016–17, 2006–16 and 1999–2016

Species	Min. sample	1-year (16–17)	10-year (06–16)	17-year (99–16)	LCL	UCL
Canada Goose	99	**-13**	**10**	**60**	-7	189
Greylag Goose	54	**10**	**40**	**64**	-13	233
Mute Swan	112	**-1**	**-20** *	**-15**	-37	18
Mallard	234	**7**	**-8**	**-2**	-14	10
Tufted Duck	44	**-26**	**-42** *	**-45**	-66	7
Goosander	54	**26**	**41** *	**27**	-13	84
(Grey Heron)	175	**9**	**-26** *	**-26** *	-38	-16
(Cormorant)	67	**108**	**23**	**17**	-25	61
Moorhen	147	**-3**	**-22** *	**-23** *	-36	-9
Coot	70	**-13**	**-34** *	**-28**	-58	5
Oystercatcher	76	**1**	**-21** *	**-33** *	-45	-15
Lapwing	81	**-2**	**-39** *	**-55** *	-67	-34
Curlew	62	**-12**	**-12**	**-50** *	-66	-30
Common Sandpiper	69	**3**	**-20** *	**-29** *	-42	-16
(Common Tern)	31	**-2**	**-20**	**-13**	-40	24
Kingfisher	72	**13**	**-15**	**-19**	-38	2
Sand Martin	76	**19**	**26**	**13**	-34	84
Sedge Warbler	92	**-28**	**-31** *	**-53** *	-61	-40
Reed Warbler	57	**-7**	**6**	**-9**	-30	16
Whitethroat	129	**0**	**8**	**20** *	4	42
Dipper	91	**-6**	**5**	**-8**	-25	18
Grey Wagtail	129	**-10**	**-13**	**-5**	-22	13
Pied Wagtail	157	**1**	**-6**	**-25** *	-39	-4
Reed Bunting	112	**-13**	**-11** *	**-7**	-19	11

Goosander increased by 41% along linear waterways between 2006 and 2016.

GOOSANDER: ADAM JONES

SPECIAL THANKS

As is the case with the Breeding Bird Survey (see back cover), the Waterways Breeding Bird Survey also relies on the dedication and enthusiasm of Regional Organisers (RO) who manage the survey locally. Without these volunteers, it would not be possible to manage such large surveys and we are in debt to them all.

The back cover shows a complete list of the ROs who manage the Breeding Bird Survey locally; many of these ROs also manage the WBBS. Please see opposite for the list of those WBBS Regional Organisers who focus solely on managing WBBS (and are therefore not listed on the back page). Please do email **wbbs@bto.org** if you would like to find out more about becoming a Regional Organiser and what is involved.

Once again, a huge thanks goes out to all the Regional Organisers, volunteers and landowners who enable this survey to be the success it is. Thank you all.

WBBS Regional Organisers in 2017:

ENGLAND

Huntingdon & Peterborough	Derek Langslow
Staffordshire (North, South, West)	Scott Petrek
Worcestershire	Steve Davies

NORTHERN IRELAND

Antrim & Belfast	Michael Stinson
Armagh	Michael Stinson
Down	Michael Stinson
Londonderry	Michael Stinson

▲ WBBS Regional Organisers are often the same individual as the BBS Regional Organiser for each region, and are listed on the back cover. Where this is not the case, the WBBS Regional Organiser is listed here. We currently have vacancies for Regional Organisers for WBBS and BBS in Dorset, London (North), Lanark, Renfrew and Dunbarton, Yorkshire (East, Hull), Warwickshire, Argyll (Mull, Coll, Tiree and Morven), Ayrshire.

INTERPRETING THE RESULTS: see page 13
RESULTS ONLINE:
www.bto.org/volunteer-surveys/wbbs/results

SPECIAL THANKS

We would like to thank all surveyors and ROs for making the BBS the success it is today. Space does not permit all observers to be acknowledged individually here, but we would especially like to thank the ROs for their efforts.

BBS Regional Organisers in 2017:

ENGLAND

Avon	Dave Stoddard
Bedfordshire	Judith Knight
Berkshire	Sarah & Ken White
Birmingham & West Midlands	Steve Davies
Buckinghamshire	Phil Tizzard
Cambridgeshire	Rob Pople
Cheshire (Mid)	Paul Miller
Cheshire (North-East and South)	Hugh Pulsford
Cleveland	Vic Fairbrother (now Michael Leakey)
Cornwall	Michael Williams
Cumbria	Colin Gay with Stephen Westerberg & Dave Piercy
Derbyshire (North, South)	Dave Budworth
Devon	Stella Beavan
Dorset	Claire Young (now **VACANT**)
Durham	David Sowerbutts
Essex (North-East)	Rod Bleach
Essex (North-West)	Graham Smith
Essex (South)	**VACANT**
Gloucestershire	Gordon Kirk
Hampshire	Glynne Evans
Herefordshire	Chris Robinson
Hertfordshire	Martin Ketcher
Huntingdon & Peterborough	Mick Twinn
Isle of Wight	Jim Baldwin
Isles of Scilly	Will Wagstaff
Kent	Geoff Orton
Lancashire (East)	Tony Cooper
Lancashire (North-West)	Jerry Martin (now Jean Roberts)
Lancashire (South)	**VACANT** (now Stephen Dunstan)
Leicestershire & Rutland	Dave Wright
Lincolnshire (East)	Phil Espin
Lincolnshire (North)	Chris Gunn
Lincolnshire (South)	Hugh Dorrington
Lincolnshire (West)	Mike Daly
London (North)	**VACANT**
London (South)	Richard Arnold
Manchester	Nick Hilton
Merseyside	Bob Harris
Norfolk (North-East)	Chris Hudson
Norfolk (North-West)	Bob Osborne
Norfolk (South-East)	Rachel Warren
Norfolk (South-West)	Vince Matthews
Northamptonshire	Barrie Galpin
Northumberland	Muriel Cadwallender
Nottinghamshire	Lynda Milner
Oxfordshire (North)	Frances Buckel
Oxfordshire (South)	John Melling
Shropshire	Jonathan Groom
Somerset	Eve Tigwell
Staffordshire (North, South, West)	Gerald Gittens
Suffolk	Mick Wright
Surrey	Penny Williams
Sussex	Helen Crabtree
The Wirral	Paul Miller
Warwickshire	Mark Smith (now **VACANT**)
Wiltshire (North, South)	Bill Quantrill
Worcestershire	Harry Green
Yorkshire (Bradford)	Mike Denton
Yorkshire (Central)	Mike Brown
Yorkshire (East, Hull)	Geoff Dobbs, Michael Hessey (now **VACANT**)
Yorkshire (Leeds & Wakefield)	**VACANT** (now Rachael Dixey)
Yorkshire (North-East)	Graham Oliver
Yorkshire (North-West)	Gerald Light (now Bjorn Blanchard)
Yorkshire (Richmond)	Mike Gibson
Yorkshire (South-East)	Aidan Gill
Yorkshire (South-West)	Grant Bigg
Yorkshire (York)	Rob Chapman

SCOTLAND

Aberdeen	Moray Souter
Angus	Peter Ellis
Argyll (Mull, Coll, Tiree & Morven)	Geoff Small (now Ewan Miles)
Argyll (mainland & Gigha) & Bute	Nigel Scriven
Arran	James Cassels
Ayrshire	Brian Broadley (now **VACANT**)
Benbecula & The Uists	Yvonne Benting
Borders	Dave McGarvie
Caithness	Donald Omand
Central	Neil Bielby
Dumfries	Andy Riches
Fife & Kinross	Norman Elkins
Inverness (East & Speyside, West)	Hugh Insley
Islay, Jura & Colonsay	David Wood
Kincardine & Deeside	Graham Cooper
Kirkcudbright	Andrew Bielinski
Lanark, Renfrew & Dunbarton	Andy Winnington (now **VACANT**)
Lewis & Harris	Chris Reynolds
Lothian	Alan Heavisides
Moray & Nairn	Melvin Morrison
Orkney	Colin Corse
Perthshire	Mike Bell
Rhum, Eigg, Canna & Muck	Bob Swann
Ross-shire	Simon Cohen
Shetland	Dave Okill
Skye	Carol Hawley
Sutherland	Bob Swann
Wigtown	Geoff Sheppard

WALES

BTO Wales Officer	John Lloyd
Anglesey	Ian Hawkins
Brecknock	Andrew King
Caernarfon	Geoff Gibbs
Cardigan	Moira Convery
Carmarthen	Terry Wells
Clwyd (East)	Anne Brenchley
Clwyd (West)	Mel ab Owain
Glamorgan (Mid, South)	Wayne Morris
Glamorgan (West)	Lyndon Jeffery
Gwent	Jerry Lewis
Merioneth	Rob Morton
Montgomery	Jane Kelsall
Pembrokeshire	Annie Haycock
Radnorshire	Carlton Parry

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BTO Northern Ireland Officer	Shane Wolsey
Antrim & Belfast	Kevin Mawhinney
Armagh	Stephen Hewitt
Down	Alastair McIlwain
Fermanagh	Michael Stinson
Londonderry	John Clarke
Tyrone	Michael Stinson

CHANNEL ISLANDS

Channel Islands (excl. Jersey)	Chris Mourant
Jersey	Tony Paintin

ISLE OF MAN

Isle of Man	David Kennett

We would be grateful for help organising the BBS in regions currently without a Regional Organiser (marked **VACANT**). If you live in one of these regions and would be interested in taking on the role, please let us know.

Many thanks are due to the following ROs who retired during the past year, having supported the BBS in their regions: Brian Broadley, Geoff Dobbs, Vic Fairbrother, Michael Hessey, Gerald Light, Jerry Martin, Geoff Small, Mark Smith, Andy Winnington and Claire Young.

We would like to thank and welcome Bjorn Blanchard, Rachael Dixey, Stephen Dunstan, Michael Leakey, Ewan Miles and Jean Roberts who have taken over as ROs during the past year.

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