



The Breeding Bird Survey 2018 *incorporating the Waterways Breeding Bird Survey*

Population trends of the UK's breeding birds



THE 2018 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 2018 were James Pearce-Higgins (Chair, BTO), Dawn Balmer (BTO), Mark Eaton (RSPB), Simon Gillings (BTO), David Noble (BTO) and Paul Woodcock (JNCC).

British Trust for Ornithology



The Nunnery
Thetford
Norfolk
IP24 2PU
www.bto.org

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Joint Nature Conservation Committee



Monkstone House
City Road
Peterborough
PE1 1JY
www.jncc.defra.gov.uk

Royal Society for the Protection of Birds



The Lodge
Sandy
Bedfordshire
SG19 2DL
www.rspb.org.uk

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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 2018. 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
Email: bbs@bto.org, Tel: 01842 750050

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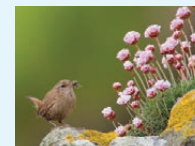
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The founder sponsors of the 1998 WBBS pilot year were Thames Water, British Waterways, Severn Trent, Hyder (Welsh Water) and Anglian Water. Since then surveys have been funded by the Environment Agency, BTO, JNCC and RSPB and sponsored by Severn Trent,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



The cover photo of a Wren was kindly supplied by Liz Cutting.

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INSIDE...

This is the twenty-fourth annual report of the BTO/JNCC/RSPB Breeding Bird Survey (BBS), documenting the population trends of widespread UK breeding bird species during the period 1994–2018.

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.

In 2017, the Breeding Bird Survey Partnership adopted the Waterways Breeding Bird Survey, 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.

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The Wider Countryside Butterfly Survey reached its 10th anniversary in 2018. During this time, 833 BBS squares have been surveyed for the WCBS.

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The latest news from the Breeding Bird Survey

Two BBS milestones were reached in 2018; the Wider Countryside Butterfly Survey reached its 10th year and overall BBS coverage topped 4,000 squares. In addition, BBS Online received a fresh new look ready for 2019 surveys.

By **Sarah Harris**, BBS National Organiser, BTO

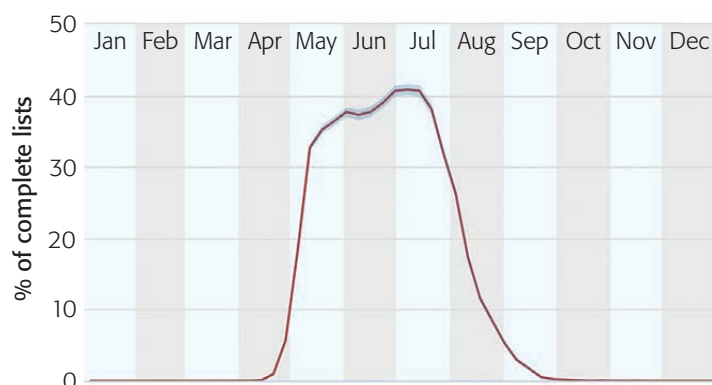
This year's BBS report focuses on showing the wider international context for the BBS, including the importance of BBS data for European bird monitoring and how data from France have helped with UK BBS research looking into climate change. This is followed by the latest BBS results, which show us how weather appears to have played a part in shaping bird population trends from 2017 to 2018. Towards the end of the report we give an overview of a recent paper published using BBS mammal data, followed by the WBBS news and trends.

Some 4,022 BBS squares were surveyed in 2018, a new record! Not only is coverage increasing, it is increasing in some key habitats known to be underrepresented. These include the 104 Upland Adjacent and 97 Upland Rover squares surveyed. Data from over 100 BBS squares were submitted long after the end of August deadline and could not be included in the analysis of trends this year. They will contribute to future trends, but this emphasises the value of prompt data entry.

IT TAKES TWO

The Upland Rovers scheme, in which a very small selection of remote, rarely (if ever) covered BBS squares have been made available for one-off visits, continues to grow – increasing the data collected from underrepresented upland habitats. The success of this scheme has prompted BTO Research Ecologists to investigate the potential impact on population trends

▼ With Early BBS visits starting in April, single visits to BBS squares could result in an unrepresentative count for certain species. For example, this BirdTrack graph shows the reporting rate through the year for Swift. This migrant species arrives in the UK through early May; a Late Visit is vital for recording species like this. For species which are particularly vocal during the Early Visit period but are less detectable later in the season, e.g. Dunnock, the Early Visit count is key.



caused by the increase in data from squares visited once per year, as opposed to the standard two-visit squares. Worryingly, an increase was detected in the number of standard BBS squares only receiving one visit in a year.

The value of having counts from two visits is that at least one of the visits will coincide with the peak activity or presence of each species in the square. When the maximum count across the two visits is taken, per species, and used in the population trend calculations, it is a good representation of the numbers present. Results showed that accounting for one-visit squares in the analysis made little difference to the results *but* even with this very low number of single visits there were slight differences that require further statistical investigation.

The Upland Rovers scheme should continue to thrive and, as this investigation suggests, make a valuable contribution to trend estimates of upland birds using single visits to these carefully selected squares. However, it remains important that core BBS squares continue to be covered by two visits, maintaining our ability to produce reliable trends. **Therefore, for all standard BBS squares, it must be stressed that two visits are required every year.** For more information on Upland Rovers, see page 26.

BBS ONLINE REFRESH

The 2019 survey season will see the launch of a refreshed online data-entry system. The system will operate much as it did before but with a fresher look and more options for data entry and download. Functions introduced include the ability to record preferences relating to receiving paper forms and BBS reports, and to choose species list ordering. BBS Online guidance and video tutorials are available at www.bto.org/bbs-online. We continue to accept paper returns gratefully.

Ten years with BBS butterflies

The Wider Countryside Butterfly Survey (WCBS) has now been running for 10 years, having started in 2009, following two pilot years in 2007 and 2008. Over this period, the survey has taken place on 1,840 1-km squares across the UK, 833 of these being BBS squares. Fifty-one species and 959,847 individual butterflies have been recorded in this time.

In 2018, 790 WCBS squares were surveyed, 66% of these by Butterfly Conservation volunteers on Butterfly Conservation squares, and the remaining 34% by BBS volunteers on BBS squares. Worryingly, 2018 saw a new coverage low for BBS contributions to the survey and the reasons for this are something which needs investigating.

Results from the 2018 surveys show some good news for the blues: Holly Blue were found on over one-third of squares surveyed, from being recorded on 17% of WCBS squares in 2017, to 34% in 2018. This was the biggest

annual increase among species compared to 2017. There was also an increase recorded for Common Blue, being more widespread in 2018 than any other year since 2010, recorded on 50% of squares. Interestingly, data show this increase was not uniform across the UK with a decrease in square occupancy in Scotland and Wales and an increase in England.

The WCBS provides crucial, structured data to the UK Butterfly Monitoring Scheme (UKBMS). The resulting UKBMS data set is one of the most important resources for understanding changes in insect populations and answering policy questions relating to status and trends in biodiversity.

Therefore, a massive thank you must go to all the BBS volunteers who have contributed to the WCBS data set over the last 10 years and to those continuing to take part today. If you are interested in finding out more about this survey, please visit www.bto.org/butterflies.

Below, Eve Tigwell, long-term BBS and WCBS volunteer from Somerset, shares her thoughts on contributing to this important survey.



REVISIT FOR THE WCBS!

We all love visiting our Breeding Bird Survey (BBS) squares each spring to find out which species are in their usual spots, to find any newcomers and, sadly, some gaps. What about the rest of the year? What's happening whilst we're not visiting?

For the last 10 years the BTO has joined other organisations to run the Wider Countryside Butterfly Survey (WCBS). It provides a brilliant excuse (as if you need one!) to visit your BBS square during the summer months and later in the day.

We're all familiar with the huge benefits that BBS data provide in monitoring the changes to our breeding bird populations; how it feeds into habitat management and a whole range of conservation matters. WCBS does the same for butterflies! With an ever-growing awareness that insect life is in serious trouble such data are invaluable.



Before WCBS I had already been visiting my BBS square outwith the spring season; just to see what was around! It's a super bit of damp woodland habitat, with some adjacent farmland; it contains some interesting flora and fauna, so there's always something to see or hear.

The timing of WCBS offers a great way to pick up on the bird species that breed out of the main season, or have multiple broods. Even when you know some species are present in an area you don't always record them during a BBS visit; adding them into your BirdTrack (www.birdtrack.net) records is a great benefit, especially if you record breeding status too.

Then there are those butterflies! Such a delight to see and to record; some even sit still long enough for photos. The woodland habitat produces lots of Silver-washed Fritillaries: there's

plenty of English oaks and a whole range of violet species. I frequently see the *valezina* form but, despite the habitat, this is the only fritillary species recorded. The most common nectar plant for all species is bramble.

Speckled Woods are common, as you would expect. The number of Meadow Browns, Gatekeepers, Ringlets and Marbled Whites must be down to the grassy edges to the rides. Most of these rides are edged by ditches full of Cuckooflower, resulting in plenty of Orange Tips and other whites; Green-veined are by far the most common.

Blues are rare, but extensive stands of Holly produce the occasional Holly Blue. High amongst the oaks there are White Admirals, but Reds are rarely recorded. I am still searching for the Purple Emperors!

By **Eve Tigwell**, BBS volunteer and Regional Organiser for Somerset

WCBS partners: Butterfly Conservation, the Centre for Ecology and Hydrology, BTO and JNCC.

Sightings and coverage in 2018

**RECORD
BREAKING!**
4,022
squares were
surveyed
in 2018

A milestone was reached in 2018 – surpassing the 4,000 mark and reaching 4,022 squares! It is thanks to the incredible 2,738 BBS volunteers, 29 of whom covered five or more squares, and the voluntary Regional Organisers who manage the survey locally, that this is even possible. What a fantastic achievement; thank you to everyone involved!

TIMINGS

Unfortunately, not everything went entirely to plan! We did face an issue when the end of August deadline for data entry came and went, and late submissions started arriving at BTO HQ on paper. The result was that 104 squares-worth of data were not included in the calculation of trends this year. These late data continue to be input and will be used in all future trend calculations. We urge all surveyors to submit their data by the **end of August** at the very latest, either via BBS Online or on paper.

The figures displayed in Table 1 include all squares surveyed in 2018. Figures stated in the introductions to each 'BBS Population Trends' page (pages 14 to 23), are the number of squares which actually contributed to the 2018 calculations.

DETECTION TYPE

On a brighter note, the option to record how each bird was first detected, by call, song or visually, has become second nature to many BBS volunteers and participation in this grew from 3,113 squares in 2017 to 3,197 in 2018 – 79% of all squares surveyed. This development is intended to build a data set to be used to better estimate species abundance.

COLONY RECORDING

The number of BBS squares in which volunteers record bird colonies remains stable. Over the last five years, colony data were entered on an average of 464 squares, for 19 species. In 2018, the figure was 474 squares and 19 species. It is important to remember any species submitted for Colony recording also need to be counted during the main transect surveys.

THE BIRDS

The BBS aims to sample habitats across the UK, with efforts being made to improve survey coverage in underrepresented areas such as uplands. Bird diversity reflects this; varying widely between squares, with

fewer than five species recorded in 56 squares in 2018. The other extreme is the 48 squares where over 50 species were recorded during the season. Once again, the square with the most diversity was near Frodsham, with 69 bird species counted in 2018.



In total, 234 bird species were recorded in 2018, from scarcer species such as Glossy Ibis and three Rose-coloured Starling through to the widespread Woodpigeon, Blackbird, and Wren, recorded on 89%, 88% and 86% of squares respectively. Whilst these are interesting figures to see, all BBS squares are equally important, regardless of the number of species or individual birds counted, because we are looking for evidence of change.

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	0	7	0	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	487	269	131	16	4	3,729
2008	2,556	406	242	121	15	1	3,341
2009	2,570	397	235	116	17	0	3,335
2010	2,568	331	247	115	16	0	3,277
2011	2,539	359	224	110	15	0	3,247
2012	2,671	383	274	117	21	4	3,470
2013	2,731	473	331	127	26	0	3,688
2014	2,735	482	339	120	27	0	3,703
2015	2,827	476	341	78	23	3	3,748
2016	2,870	490	333	127	24	2	3,846
2017	2,939	522	338	130	28	3	3,960
2018	2,983	581	318	118	18	4	4,022

*2001: foot-and-mouth disease

COVERAGE OVERVIEW

This map illustrates square distribution for 2018 and includes the **3,790 standard BBS** squares, **104 'add-on' Upland Adjacent** squares, **31 Scottish Woodland** squares and **97 Upland Rovers** squares.

Squares from the Upland BBS, covered between 2006 and 2013 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 pages 13 and 26 for more information on these surveys and square types.

Northern Ireland

"The number of squares surveyed in Northern Ireland fell due to health issues for a small number of active volunteers. Let's hope they are back on their feet in 2019. It is also key to ensure data are actually submitted after surveying – even if they are late. Thanks to all volunteers that did their squares – get out there again in 2019 (and beyond!). Every square counts!"

Shane Wolsey, BTO Northern Ireland Officer

Fifty-two of the 118 squares covered in Northern Ireland were surveyed by professional fieldworkers, funded by the Northern Ireland Environment Agency.

Isle of Man

"We increased our effort to four squares in 2018 and, following a recent and very welcome upsurge in interest from new volunteers, hope to cover another three or four squares in 2019, including an Upland Rovers square – things are looking up!"

David Kennett, BBS Regional Organiser, Isle of Man

Wales

"In an uncertain and rapidly moving world the annual publication of the BBS report is a milestone. A marker of how our environment is changing, but also a reminder of just how important that environment is. Not only to the hundreds of you that visit your squares every year, but to the wide range of audiences that use the products of your hard work to understand and protect the world we live in."

Rachel Taylor, BTO Cymru Senior Ecologist

MAP KEY

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

Scotland

"Brilliant progress! Not only record coverage again this year but, through Upland Rovers, and the continued dedication of our Scottish Regional Network and survey volunteers, we continue to make strides in achieving improved representation of upland areas. Can we break the 600 barrier in 2019? We hope so!"

Ben Darvill, BTO Development and Engagement Manager, Scotland

England

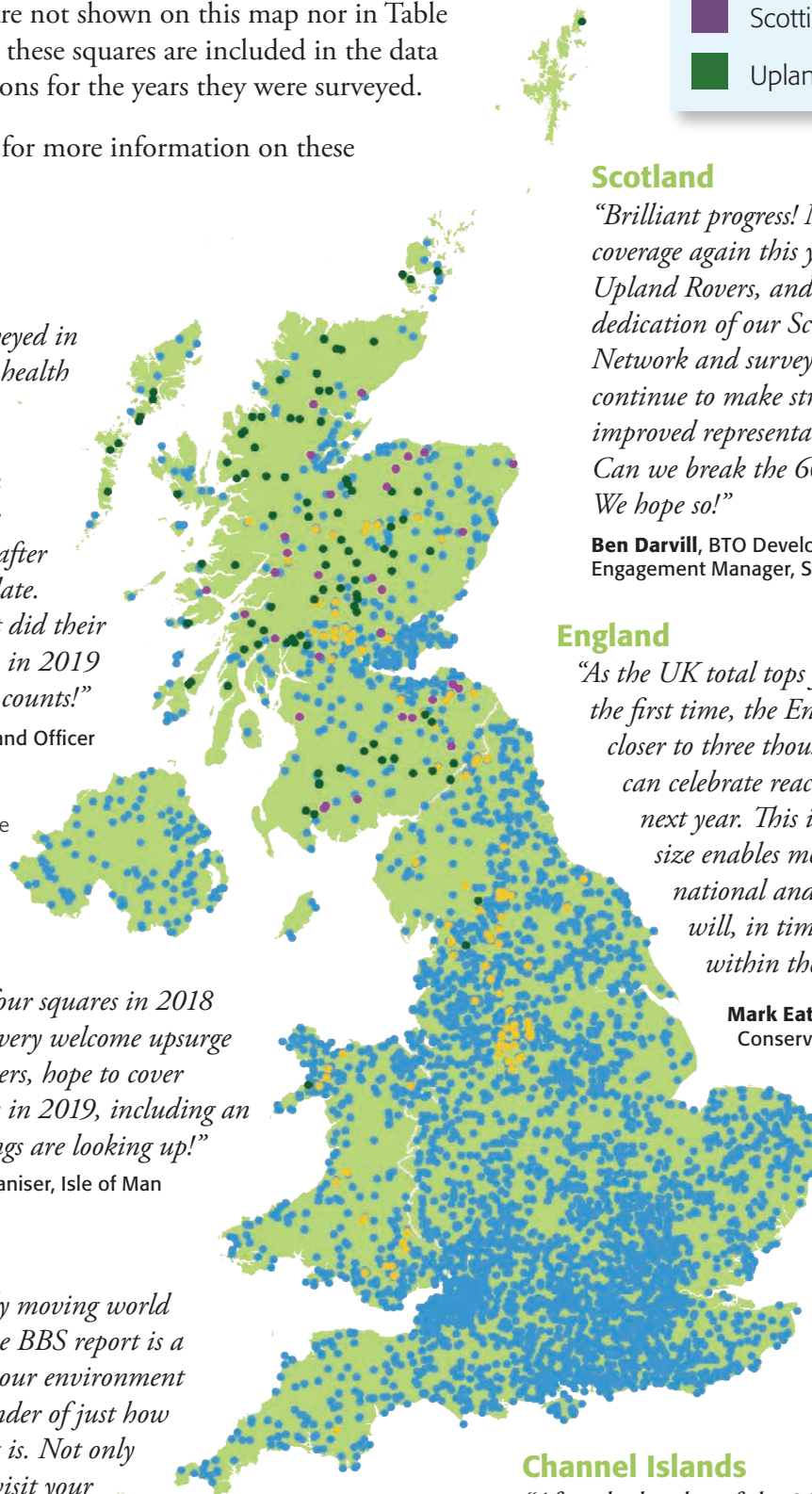
"As the UK total tops four thousand for the first time, the English total creeps closer to three thousand – hopefully we can celebrate reaching this landmark next year. This increasing sample size enables more robust trends at national and regional levels and will, in time, bring more species within the scope of the BBS."

Mark Eaton, RSPB Principal Conservation Scientist

Channel Islands

"After the heights of the 2017 coverage, the Channel Islands have suffered a minor setback in 2018. However, things are already looking promising for the 2019 season."

Sarah Harris, BBS National Organiser



BBS in the wider context

How data from the Breeding Bird Survey fit into the wider world of monitoring and long-term data collection.

By **Mark Eaton**, Principal Conservation Scientist, RSPB

The UK is fortunate to have a long heritage of bird monitoring, owing to the foresight of organisations such as the BTO and the dedication and enthusiasm of volunteer birdwatchers. The predecessor of the BBS, the Common Birds Census (CBC), began in 1962, and so for many common and widespread species we have robust annual trends stretching back for over 50 years. Whilst the UK is unusual within Europe for having such long-running monitoring, many other countries now have similar monitoring schemes for breeding birds, and the number has been growing year by year.

SHARING KNOWLEDGE

The sharing of expertise and experience has helped this upsurge in monitoring schemes. The BTO and RSPB have been active in promoting the establishment of breeding bird monitoring schemes across Europe. For example, the RSPB funded the development of a new Breeding Bird Survey in Bulgaria, using the same methods as used across the UK, working with the Bulgarian Society for the Protection of Birds. The European Bird Census Council (EBCC) has acted as an umbrella for much of this collaboration, bringing together ornithologists from across Europe.

As a result, monitoring schemes are now in place in 46 countries stretching from Portugal to Romania, and from Cyprus to Norway, although many are still in their infancy. As well as bringing obvious benefits for conservation in these individual nations, the development of such a network of monitoring schemes has provided the opportunity for collaboration to enable the bigger picture to be viewed. In this report Aleksii Lehikoinen has shown how diverse data from 14 Northern and Alpine European countries have been combined to highlight changes in mountain bird species (pages 10–11) and Dario Massimino has shown how pooling data across the UK and France has enabled better analyses of how climate change may impact bird populations within the UK (page 12).

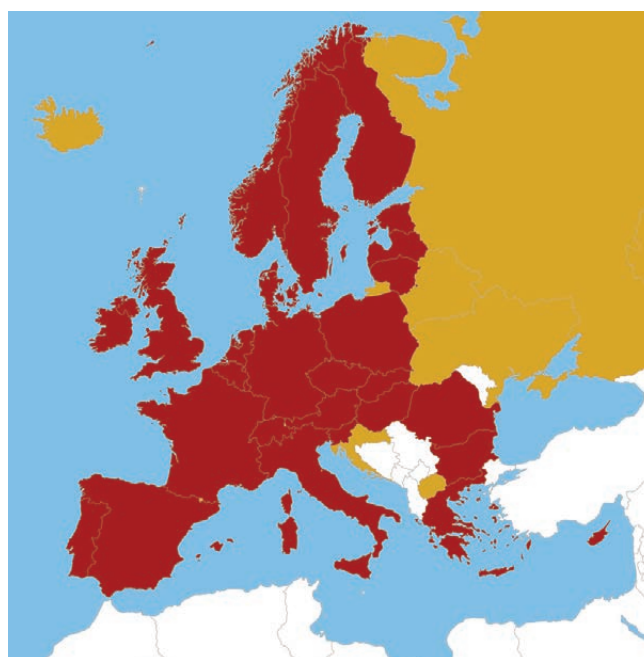
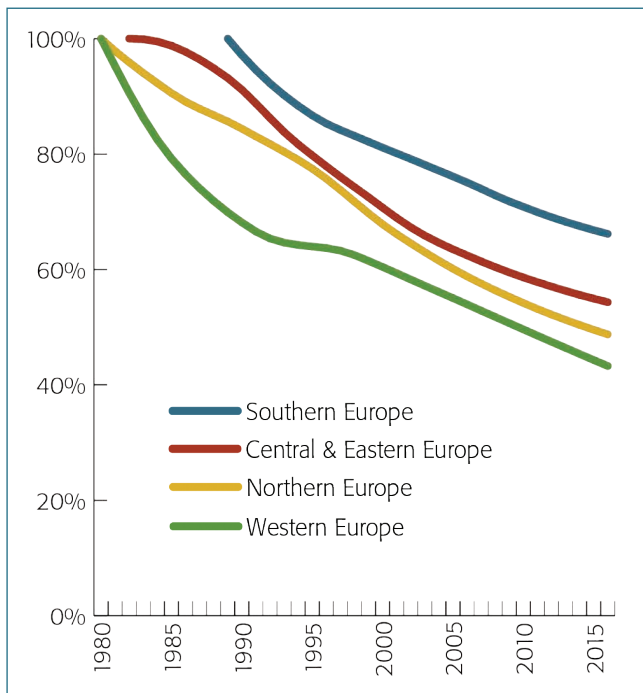


Figure 1 European bird monitoring schemes. **Red:** bird monitoring scheme which provided data to PECBMS in 2018. **Amber:** existing bird monitoring scheme. **White:** no bird monitoring scheme.

COMBINING TRENDS

The Pan-European Common Bird Monitoring Scheme (PECBMS), a project run by the EBCC, BirdLife International and other partners, began in 2002 to promote the growth of bird monitoring and the pooling of data to enable continent-wide reporting. With funding from the RSPB and European Commission, and support from partners such as the BTO, Statistics Netherlands, Czech Society for Ornithology (CSO) and the Dutch Organisation for Field Ornithology (SOVON), the scheme has gone from strength to strength. Currently 28 countries are able to generate robust annual trends for common and widespread breeding bird populations.

By combining national species trends from across Europe and accounting for national population sizes, Pan-European trends can be produced to track species' population changes at the continental scale. These can



Graph 1 The European farmland bird indicator, with a regional breakdown. Declines have occurred across all of the continent.

be used to inform the actions of conservationists and policy-makers, such as by highlighting those species in rapid decline. Many species of conservation concern in the UK are also struggling at this larger scale: Turtle Dove has declined by 80% across Europe since 1980, a decline nearly as great as that in the UK over the same period. This Pan-European trend provided the evidence for the Turtle Dove to be added to the International Union for Conservation of Nature's (IUCN) Global Red List: a European Action Plan was launched in response to this in 2018.

What's more, just as bird trends in the UK are combined into Wild Bird Indicators to give a high-level overview of changes in bird populations and, by inference, the wider environment, the same is done for Europe. The European common bird indicators produced by PECBMS have been adopted as official indicators by the European Union.

Unfortunately, much as the trends for Turtle Dove are similar, the European bird indicator shows a similar pattern to that from the UK. Most obviously, the declines shown by many farmland species in the UK are mirrored across Europe, owing to many of the same changes in agricultural management. The European farmland bird indicator has fallen by 57% since 1980. The potential to use information gathered from the PECBMS network to investigate other factors affecting birds is huge.

A VERY BIG ATLAS

European collaboration doesn't stop at PECBMS. The EBCC is in the late stages of completing the hugely ambitious *European Breeding Bird Atlas 2 (EBBA2)*.



▲ The UK BBS allows trends to be calculated for many species at various scales; English Regions, country and the UK as a whole. These can then be compared with European-wide trends.

Between 2013 and 2017 atlas data were collected by thousands of fieldworkers from the Azores to the Ural Mountains. In many countries this required intensive fieldwork – a mammoth effort in countries such as European Russia. For the UK the task was easier, and the flow of data from the BBS, together with submissions through BirdTrack and other sources, have enabled new mapping of our breeding birds at a 50x50-km scale. Watch out for the publication of this exciting new book in late 2020.

BEYOND POLITICS

Regardless of the UK's political relationship with the rest of Europe, as nature does not recognise boundaries nor should our actions to conserve it. Sharing our monitoring efforts across borders is a vital first step towards this.

FIND OUT MORE...

PECBMS Pan-European Common Bird Monitoring Scheme: www.pecbms.info

EBCC European Bird Census Council: www.ebcc.info, and *EBBA2 European Breeding Bird Atlas 2*: www.ebba2.info

EBCC needs your help in making EBBA2 happen. Sponsor a species or donate to the project by visiting the EBBA2 website.

CHOOSE SPECIES & DONATE!



Population trends of European mountain birds

Breeding Bird Survey data from some of the most remote areas of the UK have fed into research examining population trends of European mountain birds at an international scale. For many montane specialists, the news isn't good.

By **Aleksi Lehikoinen**, Academy Research Fellow – Monitoring Team, Finnish Museum of Natural History

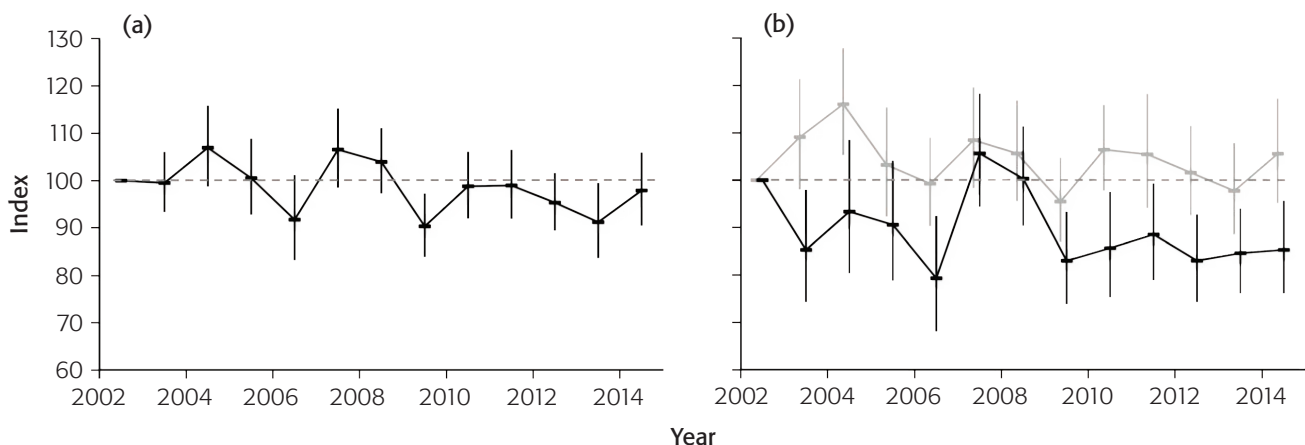
Mountain areas often hold special bird communities which are not found in the lowlands. Mountain species face many threats including climate change and changes in human land use, such as grazing pressure, afforestation or logging. Climate change has been suggested to cause distribution shifts towards mountain tops. Yet, despite the high conservation value of the mountain areas, relatively little is known about the population trends of mountain bird species even in Europe, where monitoring of common birds has been a long tradition. The reason for this is that human densities are low in the mountain areas, which decreases the possibility of recruiting volunteers for censuses, and mountain areas have sparse road networks and encompass difficult terrain, leading to low accessibility for census sites. In addition, many mountain birds have low population densities: therefore, reliable population trend estimates would require a relatively high sampling effort.

INTERNATIONAL COLLABORATION

Despite the many monitoring challenges in mountain areas, there have been significant improvements in breeding bird monitoring schemes around Europe. Thanks to the international collaboration of 14 countries (Finland, Sweden, Norway, Scotland, England, Wales, Czechia, Austria, Switzerland, Germany, Italy, France, Andorra and Spain) we were able to report a first account of population trends of 44 bird species from four major European mountain regions: Fennoscandia, UK upland, south-western (Iberia) and south-central mountains (Alps). The selected mountain species preferred open or semi-open high-altitude habitats and they were most likely to be negatively affected by climate change.

WORRYING TRENDS

Among the 44 species, 14 showed negative and eight positive trends in Europe. Overall the mountain bird species declined significantly (-7%) during 2002–2014, which is similar to the declining rate seen in common birds in Europe during the same period. Mountain specialists showed a significant -10% decline in population numbers and the slope for mountain generalists was also negative but not statistically significantly so. Fennoscandian and Iberian populations were on average declining significantly, while in the UK and Alps trends were non-significant. In the UK, the selected mountain species which were common enough to calculate population trends were Buzzard, Red Grouse,



Graph 2 (a) Mountain bird indicator for Europe.

(b) Separate indicators for generalist (**grey**) and specialist (**black**) species, during 2002–2014.

Error bars displayed represent 95% confidence intervals.

Puoiddesoavi, Enontekiö, in northwest Finland. A survey site involving a two-day hike just to reach the base camp! Rewards including breeding Temminck's Stint, and Snow Bunting and the knowledge you are collecting such valuable data. Having the relevant hill skills is essential when taking on such squares.



Golden Plover, Snipe, Skylark, Wheatear, Ring Ouzel, Carrion Crow and Raven. Of these, only Carrion Crow showed a statistically significant declining trend in mountain BBS routes. Although, the overall declining population trends are in line with the climate change predictions, other factors may have contributed to the population changes. For instance, the declining human population in the mountain areas of southern Europe has, at least regionally, led to reduced agriculture actions such as grazing of ungulates. Reduced grazing pressure can cause afforestation and thus habitat loss for species preferring open mountain habitats.

MONITORING AND RESEARCH ARE KEY

The joint European effort showed that mountain species are declining even though these areas are rather remote and often less influenced by human land use than lowlands. The reasons for observed declines are still poorly known, but they can be linked to both changes in climate and local land-use practices. Census work in the upland areas is highly encouraged to increase our knowledge of the state of the mountain birds further.

FIND OUT MORE...

Lehikoinen, A., Brotons, L., Calladine, J., Campedelli, T., Escandell, V., Flousek, J., Grueneberg, C., Haas, F., Harris, S.J., Herrando, S., Husby, M., Jiguet, F., Kålås, J.A., Lindström, Å., Lorrillière, R., Molina, B., Pladevall, C., Calvi, G., Sattler, T., Schmid, H., Sirkkiä, P.M., Teufelbauer, N. & Trautmann, S. 2019. Declining population trends of European mountain birds. *Global Change Biology* 25: 577–588.

A FLAVOUR OF MONITORING MOUNTAIN BIRDS IN FINLAND

Finnish and Swedish common bird monitoring has similar systematic sampling design: routes are situated in every 25-km square, which means that in remote areas they can be very far away from the nearest roads. Finland has a very dense forest-road network, but this network is sparse in the northern mountain areas. Here the most remote routes are situated over 25 km from the roads and volunteers need to first hike for one or two days to get to the census site to survey the routes. And who would not like to do this – camping in the wilderness and experiencing the special species!

I have personally done one such remote route in northwest Finland. After a one-day hike with my brother, the route itself was situated 16 km from our camp site. To reach this route in good census time, I woke up at 10pm and started a c.four-hour walk to the survey site in the 'nightless night'. One Ptarmigan nest was spotted on the way.

The survey site included alpine tundra and low scrubland, which was paradise for Lapland Bunting: altogether 66 pairs on a 6-km route. Golden Plover (21 pairs) and Meadow Pipit (23) were also abundant. Temminck's Stint, Dunlin and two Snow Bunting represented nice uncommon species. When I returned to the camp site after altogether a 38-km walk in the afternoon, I felt tired but happy!

French data and UK climate change

French point-count data and transect data from the UK have been used to predict future effects of climate change on bird populations.

By **Dario Massimino**, Research Ecologist, BTO

Climate change is one of the biggest threats to biodiversity and scientists agree that its impacts will be increasingly severe during the course of this century.

CRUCIAL STEPS

Understanding how species distribution and abundance will change is one of the crucial steps to identify which species and habitats are the most susceptible to climate change, and this will help us understand which measures need to be prioritised to reduce ecosystems' vulnerability.

BBS data are incredibly useful for this purpose and in 2011 we produced maps showing how abundance of four common breeding birds could change across the UK over the next 60 years. We have now taken this to a whole new level by analysing French and UK BBS data together in order to project the future abundance of 124 breeding species in Great Britain. The use of French data was crucial to predict species' future abundance under climatic conditions that do not yet exist in Britain.

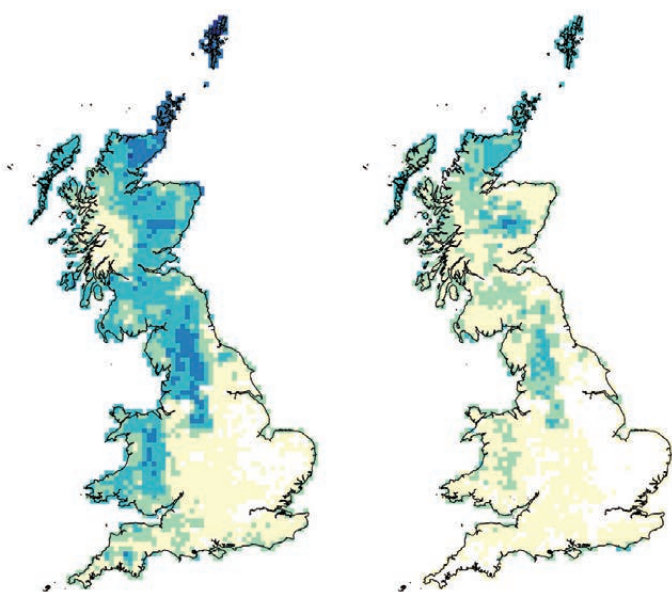


Figure 2 Maps showing the estimated abundance of Curlew at present (left) and the projection for 2080 (right) based on the effects of climate change. Darker colours show higher abundance.

ABUNDANCE CHANGE

Our analysis revealed that more breeding species are likely to increase than decrease in abundance as a result of climate change. This superficially good news is tempered by the fact that most of the 11 species that are projected to decline are already in an unfavourable conservation status, often for reasons other than climate change. In practice, it looks like climate change is going to exacerbate the threat facing species that are already in trouble. For example, when comparing the current abundance map for Curlew with the projected map for 2080, the severity of the predicted decline as a result of climate change becomes apparent, especially in the core upland areas which currently represent its strongholds. This species is already red-listed in the UK and globally classified as 'near-threatened' and the decline may turn out to be even worse if the existing causes of decline, such as habitat loss, are not addressed.

Examining such a large number of species also allowed us to produce maps showing which areas in Britain are expected to see an increase or a decrease in species abundance. This analysis showed that northern and western areas are likely to gain birds, but these will be mainly of green-listed species. Amber-listed and red-listed species will decline in many areas of Britain and especially in western Wales (amber-listed species) and east of England (red-listed species).

These analyses based on BBS data show that climate change is likely to produce significant effects on bird communities and that species already of concern are likely to be impacted hardest.

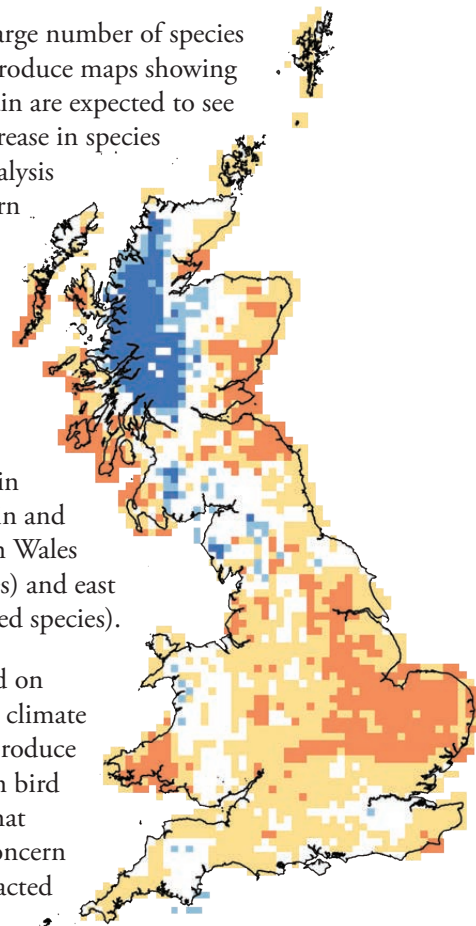


Figure 3 Map of projected gains and losses in species abundance of red-listed species by 2080. **Orange:** large losses, **yellow:** moderate losses, **pale blue:** moderate gains, **dark blue:** large gains.

FIND OUT MORE...

Massimino, D., Johnston, A., Gillings, S., Jiguet, F. & Pearce-Higgins, J.W. 2017. Projected reductions in climatic suitability for vulnerable British birds. *Climatic Change* 145: 117–130.

Interpreting BBS and WBBS results

The pages which follow (pages 14–25 and page 29) contain the annual bird and mammal 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 tips 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 on which a species has been recorded per year during the trend period. For UK BBS 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 an average of 30 squares during the trend period.

The one-year trend from 2017–2018 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...

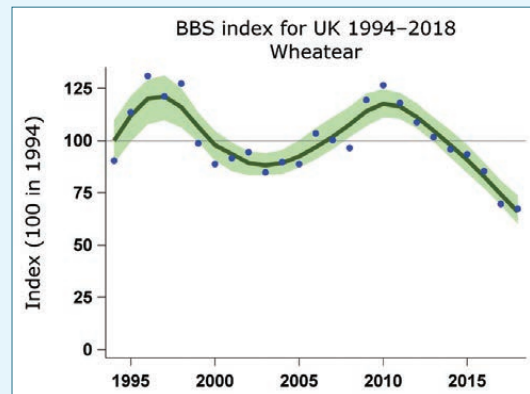
BBS bird trend graphs online: www.bto.org/bbs-graphs
BBS bird trend tables online: www.bto.org/bbs-tables
BBS mammal trends online: www.bto.org/bbs-mammals
WBBS results online:
www.bto.org/volunteer-surveys/wbbs/results

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 and WBBS index graphs show:

- smoothed trend – dark green line
- confidence interval (85%) – pale green shading
- annual index values – blue dots



TRENDS AND TABLES EXPLAINED

Species	Min. sample	1-year (17–18)	10-year (07–17)	22-year (95–17)	LCL	UCL
Wheatear	362	-3	-27 *	-34 *	-44	-16
Dipper	65	-1	-12	-28	-49	6

- Trends for species in brackets are reported with caveats (pages 26 and 29).
- For bird trends, **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: one-year, 10-year and ‘all-time’.
- The short-term change covers the most recent year of the survey, *i.e.* for BBS and WBBS: 2017 to 2018.
- The long-term changes for both BBS and WBBS, cover the lifetime of the survey (BBS birds: 1994–2018, BBS mammals 1995–2018, WBBS: 1998–2018). The 10-year trends cover 2006–2018 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 bird trend: 1995–2017, BBS mammal trend: 1996–2017 and 1999–2017 for WBBS.

United Kingdom – population trends

Goldcrest declined by **38%** in the UK between 2017 and 2018

Data from 3,918 BBS squares surveyed across the UK in 2018 have been added to the BBS data set and used to calculate population trends for 117 bird species. There are 10-year and long-term trends for all species which reach the reporting threshold for the UK for each time period and a one-year trend for all 117 species. Mandarin and Nightingale are also included here, having reached the lower reporting threshold set for England.

STATISTICALLY SIGNIFICANT RESULTS

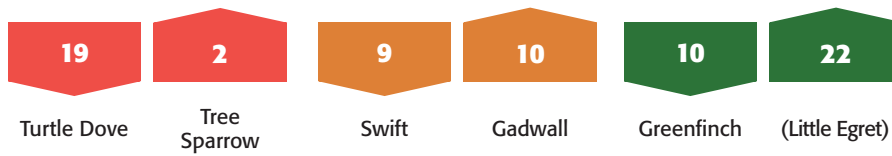
Period	No. species	Greatest change in UK trends
Long-term (95–17) increases	39	(Little Egret): 2,316%
Long-term (95–17) declines	39	Turtle Dove: -94%
Short-term (17–18) increases	10	Crossbill: 88%
Short-term (17–18) declines	28	(Common Tern): -68%

Species listed in brackets are reported with a caveat. See page 26.

▼ Total number of long-term (1995–2017) statistically significant results by **Birds of Conservation Concern 4** (BoCC4) status: Red, Amber or Green, for species classified.



▼ Total number of long-term (1995–2017) increasing or declining by BoCC4 status, followed by the species with the greatest population change for each status list.



TREND TIME PERIODS

The trends for the lifetime of the survey, 10 years and 2017–2018 are presented in this report and the five-year trends are available online at www.bto.org/bbs-tables. Shorter-term trends provide insights into changes over time, e.g. increasing or decreasing rates of decline and allow some species, such as **Marsh Harrier**, to reach the reporting thresholds for these shorter time periods. Worryingly, the continuing declines and localisations of species such as **Pied Flycatcher** and **Willow Tit** means they do not reach the reporting threshold for these more recent time periods. See page 13 for information on trends and thresholds.

BEAST FROM THE EAST

The year-on-year trends suggest the spell of fierce winter weather nicknamed the ‘Beast from the East’ in late February and early March 2018 hit some of the UK’s smallest resident bird species hard. **Goldcrest** declined

by 38%, **Long-tailed Tit** by 22% and **Wren** by 21% between 2017 and 2018. **Goldcrest** and **Wren** can be double-brooded and all three species have clutch sizes of between five and eight eggs: therefore it is possible for populations to recover fairly quickly providing this is a one-off harsh winter.

Kingfisher also appears to have been affected, with a year-on-year decline of 38% whereas the population trend for **Grey Heron** from 2017 to 2018 remained stable.

SAHARAN STRUGGLES?

Winds from the north through much of the spring migration period could have taken their toll on migrant species returning to the UK from Africa, but conditions on wintering grounds could also have contributed to the year-on-year declines for some of the UK’s migrant species.

House Martin (-17%), **Sand Martin** (-42%) and **Swift** (-20%) all declined



between 2017 and 2018, along with **Whitethroat** (-18%) and **Willow Warbler** (-23%).

BUCKING THE TREND

Unlike **Whitethroat**, **Willow Warbler**, **Swift** and **Sand Martin** which, according to BirdTrack data, were marginally late back to the UK in spring 2018, **Cuckoo** arrived back not only on cue, but also in good numbers. Did they find a weather window in which to cross the Saharan desert or did they find conditions favourable over the winter? Whatever the cause, an increase of 22% between 2017 and 2018 provides a welcome break at the end of a long-term decline of 41% (1995–2017) in the UK.

Annual fluctuations can provide insights into the influences driving longer-term change, for example how a trend to increasingly unsettled or extreme weather conditions might influence bird population trends.

Table 2 UK population trends during 2017–18, 2007–17 and 1995–2017

Species	Min. sample	1-year (17–18)	10-year (07–17)	22-year (95–17)	LCL	UCL
Canada Goose	540	-12	-13	76 *	44	133
Greylag Goose	266	9	30	178 *	33	554
Mute Swan	271	-10	19 *	36 *	9	86
Egyptian Goose	47	8	73 *			
Shelduck	154	23	-9	-9	-47	42
Mandarin	35	-14	66 *	425 *	177	1,447
Gadwall	46	8	117 *	213 *	65	520
Mallard	1,413	-6	-6	12 *	1	21
Teal	43	-17	46			
Tufted Duck	165	-12	4	41	-6	107
Goosander	44	-8	21	-24	-53	57
Red Grouse	151	3	62 *	26 *	1	54
Red-legged Partridge	592	-12 *	-13 *	10	-2	26
Grey Partridge	217	-6	-36 *	-63 *	-68	-54
Pheasant	1,991	0	-1	34 *	25	43
Indian Peafowl	43	-22	-35			
Little Grebe	74	10	21	42 *	4	102
Great Crested Grebe	75	-13	-20	3	-31	36
(Grey Heron)	688	3	-20 *	-10	-24	2
(Little Egret)	54	-21	69 *	2,316 *	784	>10,000
(Cormorant)	262	-18	0	23	-11	61
Sparrowhawk	356	-7	-23 *	-22 *	-32	-10
Marsh Harrier	42	20	40 *			
Red Kite	177	9	255 *	1,624 *	886	3,621
Buzzard	1,173	-3	22 *	96 *	79	119
Moorhen	667	-14 *	-28 *	-16 *	-24	-6
Coot	285	-11	-19 *	9	-10	39
Oystercatcher	370	-4	-10 *	-23 *	-34	-12
Lapwing	691	-5	-33 *	-42 *	-49	-33
Golden Plover	65	11	5	-5	-30	34
Curlew	531	-3	-15 *	-48 *	-55	-40
Snipe	175	0	-3	32 *	6	62
Common Sandpiper	74	4	-10	-26 *	-45	-5
Redshank	88	9	-24	-44 *	-64	-14
(Common Tern)	69	-68 *	83	77	-35	243
Feral Pigeon	722	12 *	-18 *	-25 *	-36	-13
Stock Dove	888	6	35 *	26 *	13	41
Woodpigeon	2,706	8 *	2	36 *	29	45
Turtle Dove	66	-47	-83 *	-94 *	-96	-91
Collared Dove	1,440	-5 *	-21 *	0	-7	9
Cuckoo	674	22 *	-2	-41 *	-49	-34
(Barn Owl)	52	14	-17 *	289 *	161	578
(Tawny Owl)	96	-6	-12	-29 *	-42	-11
Little Owl	87	22	-43 *	-58 *	-68	-47
Swift	1,051	-20 *	-42 *	-57 *	-62	-51
Kingfisher	57	-38 *	-21	-17	-45	19
Gt Spotted Woodpecker	1,199	6	2	130 *	115	149
Green Woodpecker	871	-5	-17 *	23 *	11	35
Kestrel	685	2	-26 *	-32 *	-40	-23
Hobby	45	1	-19	-15	-42	23
Peregrine	52	-14	-20	-36 *	-57	-4
Ring-necked Parakeet	88	22	127 *	1,710 *	663	11,481
Jay	848	15 *	4	17 *	6	26
Magpie	2,046	-1	-1	-3	-8	2
Jackdaw	1,917	0	20 *	55 *	43	67
Rook	1,399	-3	-16 *	-23 *	-31	-14
Carrion Crow	2,573	0	1	18 *	10	27
Hooded Crow	142	-20 *	7	4	-22	36
Raven	357	22	5	38	-2	100
Coal Tit	904	7	-10 *	0	-11	15
Marsh Tit	149	18	-31 *	-44 *	-54	-29
Willow Tit	46	-22		-83 *	-88	-76
Blue Tit	2,507	13 *	-9 *	-2	-5	2
Great Tit	2,390	16 *	-11 *	31 *	25	36
Skylark	1,844	3	-10 *	-18 *	-24	-13
Sand Martin	143	-42 *	11	33	-23	164
Swallow	2,124	-14 *	-23 *	3	-3	11
House Martin	976	-17 *	-23 *	-18 *	-27	-7
Cetti's Warbler	52	-10	124 *			
Long-tailed Tit	1,056	-22 *	1	15 *	3	26
Willow Warbler	1,446	-23 *	-3	-13 *	-22	-6
Chiffchaff	1,732	-27 *	54 *	115 *	103	128
Wood Warbler	51	28	-19	-63 *	-79	-39
Sedge Warbler	311	-14 *	-18 *	-12	-31	14
Reed Warbler	139	-21 *	-2	25	-1	62
Grasshopper Warbler	87	-22	-18	-8	-34	21
Blackcap	1,810	6 *	62 *	149 *	131	168
Garden Warbler	462	-7	-12	-26 *	-36	-13
Lesser Whitethroat	296	-8	7	2	-12	16
Whitethroat	1,480	-18 *	3	18 *	9	32
Goldcrest	870	-38 *	-15 *	9	-9	33
Wren	2,659	-21 *	9 *	34 *	28	40
Nuthatch	574	20 *	32 *	96 *	73	133
Treecreeper	386	-2	2	4	-10	23
Starling	1,809	-3	-29 *	-52 *	-56	-48
Ring Ouzel	45	-13	28			
Blackbird	2,681	-4 *	-1	25 *	20	30
Song Thrush	2,177	-18 *	3	29 *	21	37
Mistle Thrush	1,200	-5	-17 *	-25 *	-31	-18
Spotted Flycatcher	176	-24	-10	-46 *	-61	-27
Robin	2,576	-15 *	4 *	27 *	22	32
Nightingale	33	37	-27	-62 *	-78	-37
Pied Flycatcher	40	-24		-42 *	-73	-1
Redstart	189	-16	22 *	15	-4	33
Whinchat	77	-12	-23	-56 *	-70	-40
Stonechat	167	-39 *	-37 *	87 *	38	144
Wheatear	362	-3	-27 *	-34 *	-44	-16
Dipper	65	-1	-12	-28	-49	6
House Sparrow	1,728	1	5 *	-5	-11	4
Tree Sparrow	201	9	38 *	113 *	52	174
Dunnock	2,243	-6 *	-1	21 *	15	26
Yellow Wagtail	165	-6	12	-46 *	-55	-32
Grey Wagtail	231	-25 *	-26 *	-2	-18	20
Pied Wagtail	1,345	-25 *	-8 *	-9 *	-15	-2
Meadow Pipit	852	-10 *	7	-11 *	-19	-2
Tree Pipit	149	-16	5	-5	-28	21
Chaffinch	2,685	-2	-25 *	-14 *	-19	-10
Bullfinch	682	-24 *	25 *	12 *	0	24
Greenfinch	1,806	-3	-67 *	-59 *	-62	-57
Linnet	1,285	-4	12 *	-17 *	-24	-9
Lesser Redpoll	179	-23	29 *	34	-4	76
Crossbill	60	88 *	-22	-12	-46	30
Goldfinch	1,873	1	67 *	146 *	130	163
Siskin	208	-13	4	33 *	2	73
Corn Bunting	146	26 *	4	-30 *	-45	-10
Yellowhammer	1,240	-3	-9 *	-21 *	-27	-15
Reed Bunting	544	-13 *	5	37 *	21	55

England – population trends

Nightingale declined by **62%** in England between 1995 and 2017

In 2018, data from 2,934 squares contributed to the English BBS data set in time to allow trends to be produced for 112 species. This includes seven species for which it is possible to calculate only the shorter-term trends of one, five and 10 years. The five-year trends are published online.

STATISTICALLY SIGNIFICANT RESULTS

Period	No. species	Greatest change in English trends	
Long-term (95–17) increases	37	Red Kite:	19,069%
Long-term (95–17) declines	36	Turtle Dove:	-94%
Short-term (17–18) increases	9	Nuthatch:	25%
Short-term (17–18) declines	35	Grasshopper Warbler:	-47%

NUTHATCH DOUBLE

During the lifetime of the BBS, **Nuthatch** have increased by 103% (1995–2017). Looking at the trend from 2017 to 2018, it appears **Nuthatch**, with its varied diet of invertebrates and seeds, weathered the Beast from the East, with an increase of 25% across England.

Nuthatch are expanding across Britain, spreading northwards into Scotland. Research conducted on the Continent, where populations have also increased by 103% between 1980–2016 (PECBMS), showed that, long-term, generally milder winters are benefiting this species.

CONTINUING DECLINES

Both **Grey Partridge** and **Nightingale** have reached a new population low with declines greater than 60% for the first time. **Grey Partridge** decline (-60%, 1995–2017) has been linked

to changes in agricultural practices, such as the spraying of herbicides and pesticides which reduce prey abundance during chick rearing, and a reduction of nesting cover at field boundaries. There is also some suggestion **Grey Partridge** can be burdened with caecal nematodes, passed on from farm-reared **Pheasant**; however, evidence that this could impact survival rates is conflicting.

For **Nightingale**, the long-term decline is now at 62% (1995–2017). Reasons include the loss of suitable breeding and foraging habitat in the UK, through deer browsing, and reduced woodland management leading to an overshadowed and outcompeted understorey, along with possible pressures on migration

routes and habitat degradation on the wintering grounds. It is worthy of note that the UK is at the northern limit of the **Nightingale's** global range.

As with **Nightingale**, **Tree Pipit** is also a long-distance migrant, wintering in the humid zone of western Africa. As a group, passerines from the UK wintering in this area are those for which we see the strongest long-term declines. **Tree Pipit** have declined by 53% between 1995 and 2017 and have also contracted in range, especially in eastern England. In southern England, a change in the structure of forests has been suggested as contributing to declines. As plantations mature and management of lowland woods decreases, so too does suitable breeding habitat for **Tree Pipit**.

FIND OUT MORE...

PECBMS. 2019. *Trends of common birds in Europe, 2018 update.* (www.pecbms.info/trends_2018).

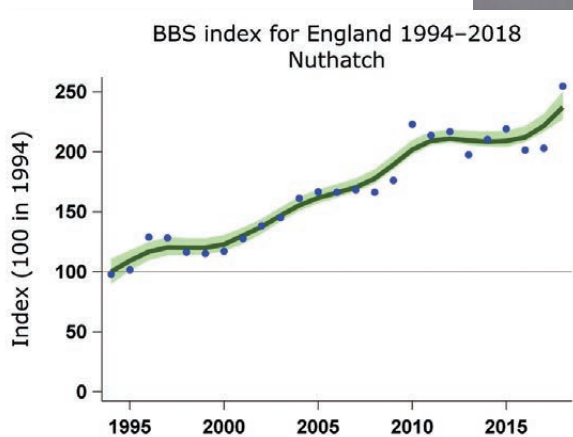


Table 3 Trends in England during 2017–18, 2007–17 and 1995–2017

Species	Min. sample	1-year (17–18)	10-year (07–17)	22-year (95–17)	LCL	UCL
Canada Goose	495	-14	-15	58 *	28	100
Greylag Goose	220	-19	64 *	322 *	163	662
Mute Swan	232	-17	18	28 *	1	73
Egyptian Goose	47	8	73 *			
Shelduck	125	22	-5	21	-28	59
Mandarin	34	-9	59 *	415 *	127	1,416
Gadwall	43	3	123 *	182 *	56	532
Mallard	1,181	-9 *	-9 *	18 *	6	32
Tufted Duck	143	-21	-5	18	-16	57
Red Grouse	88	23 *	60 *	16	-17	60
Red-legged Partridge	572	-11 *	-15 *	3	-9	20
Grey Partridge	194	-3	-37 *	-60 *	-67	-53
Pheasant	1,669	-1	-1	35 *	26	47
Indian Peafowl	40	-19	1			
Little Grebe	58	19	11	18	-25	88
Great Crested Grebe	69	-15	1	-9	-36	24
(Grey Heron)	564	6	-25 *	-20 *	-29	8
(Little Egret)	50	-22	66 *	2,153 *	682	>10,000
(Cormorant)	219	-9	-4	13	-9	48
Sparrowhawk	295	-9	-29 *	-29 *	-39	-19
Marsh Harrier	36	17	39 *			
Red Kite	136	12	359 *	19,069 *	>10,000	>10,000
Buzzard	819	-7	46 *	213 *	166	263
Moorhen	617	-13 *	-28 *	-18 *	-25	-8
Coot	257	-16 *	-18 *	12	-9	42
Oystercatcher	208	-7	9	47 *	20	90
Lapwing	580	-9 *	-30 *	-28 *	-38	-19
Golden Plover	30	-13	23			
Curlew	347	-6	-5	-30 *	-39	-17
Snipe	93	-4	29 *	26	-4	76
Common Sandpiper	32	1	-15	-49 *	-67	-16
Redshank	62	-16	-37 *	-46 *	-61	-29
(Common Tern)	64	5	5	47	-9	185
Feral Pigeon	587	9	-22 *	-31 *	-40	-17
Stock Dove	818	3	38 *	27 *	14	44
Woodpigeon	2,157	9 *	0	39 *	32	49
Turtle Dove	65	-47	-83 *	-94 *	-96	-91
Collared Dove	1,249	-7 *	-24 *	-4	-12	4
Cuckoo	483	7	-32 *	-70 *	-74	-66
(Barn Owl)	50	14	-15	286 *	137	537
(Tawny Owl)	83	17	-5	-21	-38	0
Little Owl	84	15	-44 *	-57 *	-68	-44
Swift	907	-18 *	-39 *	-56 *	-61	-50
Kingfisher	51	-38 *	-25 *	-11	-37	25
Gt Spotted Woodpecker	1,039	10 *	-6 *	102 *	86	118
Green Woodpecker	817	-5	-16 *	32 *	22	44
Kestrel	606	0	-18 *	-17 *	-25	-8
Hobby	44	-10	-21	-17	-40	20
Peregrine	32	-22	-17	40	-20	222
Ring-necked Parakeet	88	22	127 *	1,711 *	646	7,860
Jay	729	13 *	-2	1	-7	10
Magpie	1,709	0	2	-1	-6	4
Jackdaw	1,543	-1	27 *	69 *	55	85
Rook	1,117	-4	-12 *	-13 *	-23	-4
Carrion Crow	2,111	-4	6 *	28 *	18	37
Raven	172	8	44 *	50	-19	367
Coal Tit	608	9	8	25 *	8	49
Marsh Tit	136	8	-24 *	-42 *	-54	-29
Willow Tit	32	21	-53 *	-85 *	-90	-78
Blue Tit	2,031	12 *	-8 *	-3	-6	1
Great Tit	1,932	17 *	-12 *	26 *	21	32
Skylark	1,470	0	-9 *	-24 *	-28	-20
Sand Martin	89	-37 *	-6	-5	-33	43
Swallow	1,631	-20 *	-24 *	-1	-7	7
House Martin	752	-17 *	-32 *	-34 *	-41	-26
Cetti's Warbler	49	-12	138 *			
Long-tailed Tit	934	-23 *	1	10 *	0	23
Willow Warbler	950	-30 *	-16 *	-44 *	-50	-34
Chiffchaff	1,450	-30 *	51 *	116 *	101	132
Sedge Warbler	197	-30 *	-14	-23	-42	2
Reed Warbler	131	-20 *	2	24	0	55
Grasshopper Warbler	40	-47 *	-20	-34	-56	10
Blackcap	1,533	7 *	54 *	121 *	108	138
Garden Warbler	375	-5	-14 *	-31 *	-39	-19
Lesser Whitethroat	283	-4	12 *	3	-11	23
Whitethroat	1,269	-18 *	3	15 *	9	24
Goldcrest	626	-41 *	9	40 *	18	66
Wren	2,076	-18 *	15 *	29 *	23	35
Nuthatch	491	25 *	30 *	103 *	83	130
Treecreeper	288	13	13	2	-12	16
Starling	1,469	-1	-35 *	-61 *	-64	-57
Ring Ouzel	31	-21	-17			
Blackbird	2,132	-5 *	-1	22 *	17	26
Song Thrush	1,700	-17 *	3	26 *	20	34
Mistle Thrush	943	-19 *	-23 *	-38 *	-44	-33
Spotted Flycatcher	117	20	-40 *	-67 *	-73	-57
Robin	2,034	-13 *	7 *	32 *	27	37
Nightingale	33	36	-27	-62 *	-78	-39
Redstart	104	-14	24	3	-20	34
Whinchat	33	20	-5	-48 *	-67	-23
Stonechat	71	-40 *	-23 *	86 *	-19	196
Wheteater	202	-21 *	-18 *	-24	-44	10
Dipper	31	2	-10	-44	-70	7
House Sparrow	1,403	-1	3	-16 *	-24	-10
Tree Sparrow	155	1	30 *	63 *	21	114
Dunnock	1,825	-6 *	1	16 *	10	23
Yellow Wagtail	161	-6	13	-45 *	-56	-34
Grey Wagtail	156	-23 *	-16 *	7	-16	36
Pied Wagtail	1,013	-24 *	-10 *	-8 *	-15	-1
Meadow Pipit	451	-18 *	3	-17 *	-27	-6
Tree Pipit	74	-32 *	-27 *	-53 *	-70	-22
Chaffinch	2,090	-4 *	-29 *	-18 *	-22	-14
Bullfinch	529	-16 *	30 *	11 *	1	23
Greenfinch	1,527	-2	-65 *	-57 *	-60	-53
Linnet	1,041	-1	28 *	-18 *	-27	-11
Lesser Redpoll	68	-46 *	33	-13	-52	44
Crossbill	34	107	22			
Goldfinch	1,542	0	78 *	142 *	125	161
Siskin	79	-3	27	55	-20	306
Corn Bunting	139	17 *	-2	-31 *	-45	-10
Yellowhammer	1,076	-2	-13 *	-30 *	-34	-24
Reed Bunting	410	-15 *	13 *	39 *	20	66

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

Rook declined by **37%** in Scotland between 1995 and 2017

The Scottish BBS received data from 557 squares in 2018, and with these added to the long-term data set, it was possible to calculate trends for 69 species. In the shorter-term, it is possible to calculate 10-year trends for four species where a long-term trend isn't possible due to the long-term average sample size not reaching the reporting threshold.

STATISTICALLY SIGNIFICANT RESULTS

Period	No. species	Greatest change in Scottish trends
Long-term (95–17) increases	23	Chiffchaff: 780%
Long-term (95–17) declines	11	Greenfinch: -66%
Short-term (17–18) increases	3	Crossbill: 57%
Short-term (17–18) declines	12	Sand Martin: -45%

STARLINGS STRUGGLE

Starling have declined by 28% in Scotland between 1995 and 2017. The reasons behind this aren't fully understood and, with increases in breeding success, it is suspected these declines are due to lower first-year survival rates outside the breeding season.

Changes in grazing practices are likely to have influenced **Starling** decline, at least in some part. Changes in grazing density and the livestock grazed can alter sward structure in pastoral areas, causing them to be less suitable for foraging. The use of insecticide can further reduce food availability.

Further research into urban **Starling** populations is needed, with attention turned to the lack of available nest sites in well-insulated homes, with few entrance holes into suitable nest sites a potential problem.

CORVID CREW

Another species that feeds on ground-dwelling invertebrates, the **Rook**, is also in decline. Their distribution in Scotland largely excludes higher ground and a 37% decline between 1995 and 2017 has been recorded across the country.

Bird Atlas 2007–11 revealed relatively small changes in range since 1968 across the UK but that changes noted were in the northerly fringes of the species' range, for the most part, this being the Scottish Highlands.

As with **Starling**, changes in agricultural practices are considered to be the main reason for **Rook** decline. Unlike **Starling**, a decrease in breeding success has been recorded in recent years for **Rook**.

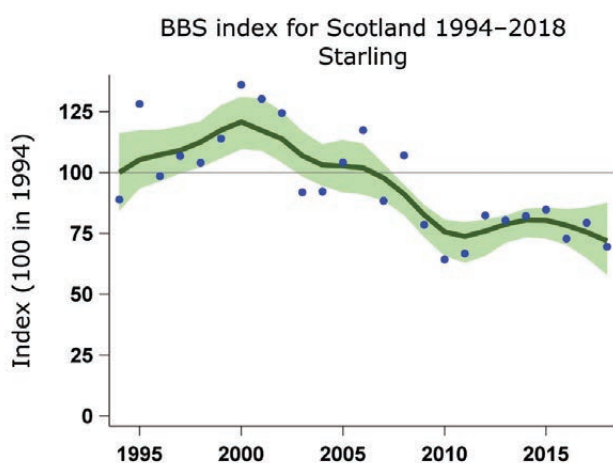
It may be surprising to learn **Hooded Crow** have declined by 40% between 1995 and 2017 in Scotland. The reasons behind this are largely unknown. However, it appears to be a primarily Scottish issue with populations in Northern Ireland increasing by 166% during the same time period.

POSITIVE NEWS

Scotland has some of the largest long-term population trend increases seen in BBS, including for the following species: **Great Spotted Woodpecker** (417%), **Chiffchaff** (780%), **Blackcap** (451%) and **Tree Sparrow** (389%) between 1995 and 2017.

THERE'S MORE

The five-year trends are given online at www.bto.org/bbs-tables, including a trend for **Spotted Flycatcher**.



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.

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



The Scottish Starling population declined by 28% between 1995 and 2017.

Table 4 Trends in Scotland during 2017–18, 2007–17 and 1995–2017

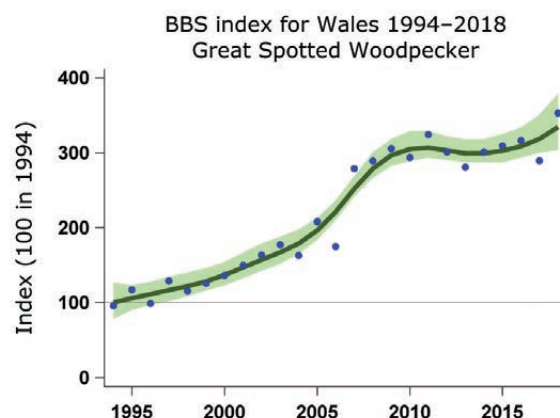
Species	Min. sample	1-year (17–18)	10-year (07–17)	22-year (95–17)	LCL	UCL
Greylag Goose	33	58	5	93	-49	644
Mallard	118	7	6	-12	-27	9
Red Grouse	58	-5	51 *	30	-3	68
Pheasant (Grey Heron)	161	4	-1	18	-4	49
Buzzard	56	6	-11	15	-26	70
Oystercatcher	163	9	-5	28 *	8	58
Lapwing	141	-2	-17 *	-38 *	-51	-21
Golden Plover	88	6	-38 *	-55 *	-66	-44
Curlew	36	20	1	-10	-39	28
Snipe	129	3	-24 *	-61 *	-69	-52
Common Sandpiper	65	3	-12	32 *	2	72
Feral Pigeon	37	6	-11	-23 *	-42	0
Stock Dove	73	29	-11	-6	-38	54
Woodpigeon	31	57	-5			
Collared Dove	238	12	14	15	-7	47
Cuckoo	61	7	-2	8	-29	61
Swift	85	30 *	26 *	39 *	13	73
Gt Spotted Woodpecker	56	-28	-43 *	-59 *	-71	-42
Kestrel	64	-21 *	35 *	417 *	271	684
Jay	40	14	-44 *	-59 *	-74	-29
Magpie	39	-25	40 *			
Jackdaw	62	-6	31 *	55 *	16	169
Rook	138	14	15	30	-4	77
Carrion Crow	123	4	-19	-37 *	-52	-13
Hooded Crow	222	10	-13	-4	-26	24
Raven	55	-14	-23 *	-40 *	-61	-15
Coal Tit	57	60	-1	36	-5	108
Blue Tit	148	0	-21 *	-14	-33	9
Great Tit	189	9	-9	2	-12	22
Skylark	179	6	-6	47 *	26	74
Sand Martin	231	11 *	-10	-6	-21	14
Swallow	36	-45 *	33	83	-26	612
House Martin	203	4	-21 *	13	-5	37
	79	-27 *	-1	120 *	43	203

Species	Min. sample	1-year (17–18)	10-year (07–17)	22-year (95–17)	LCL	UCL
Long-tailed Tit	35	32	26	54	-3	153
Willow Warbler	239	-17 *	4	18	-2	37
Chiffchaff	74	-23 *	173 *	780 *	481	1,637
Sedge Warbler	61	7	-15	20	-26	87
Blackcap	81	-6	88 *	451 *	285	801
Garden Warbler	31	-17	-15			
Whitethroat	95	-22	12	111 *	19	215
Goldcrest	101	-33 *	-36 *	15	-22	53
Wren	256	-40 *	-9	62 *	43	84
Treecreeper	42	-19	-16	1	-32	54
Starling	165	-12	-23 *	-28 *	-46	-4
Blackbird	227	-6	3	33 *	15	57
Song Thrush	204	-18 *	11	39 *	15	65
Mistle Thrush	86	3	-3	22	-10	70
Robin	225	-24 *	-5	27 *	10	47
Stonechat	41	-42 *	-51 *	61 *	4	152
Wheatear	88	13	-32 *	-37 *	-55	-15
House Sparrow	115	6	10	46 *	11	96
Tree Sparrow	33	40	133 *	389 *	111	1,357
Duncock	160	-14	-11	38 *	19	65
Grey Wagtail	33	-25	-40 *	-11	-41	32
Pied Wagtail	152	-33 *	-7	-17	-30	3
Meadow Pipit	234	-6	12 *	-11	-22	2
Tree Pipit	39	-16	27	72 *	20	137
Chaffinch	271	1	-18 *	-5	-14	5
Bullfinch	49	-37 *	32	33	-12	89
Greenfinch	107	-3	-69 *	-66 *	-74	-54
Linnet	99	-17	-13	-4	-36	27
Lesser Redpoll	55	-18	75 *	60 *	9	155
Crossbill	34	57 *	-28			
Goldfinch	118	2	64 *	219 *	148	334
Siskin	86	-17	-3	28	-5	80
Yellowhammer	122	-3	10	29 *	4	57
Reed Bunting	70	-5	-1	67 *	20	128

Wales – population trends

Swift
declined by
69%
in Wales between
1995 and 2017

Data from 310 BBS squares contributed to the long-term data set for Wales in 2018 and were used to produce trends for 60 bird species. Shorter-term trends of five (published online) and 10 years have been calculated where the reporting thresholds are met. For Grey Wagtail and Lesser Redpoll, this has allowed shorter-term trends to be calculated despite long-term trends not reaching the required sample size.



STATISTICALLY SIGNIFICANT RESULTS

Period	No. species	Greatest change in Welsh trends
Long-term (95–17) increases	17	Canada Goose: 433%
Long-term (95–17) declines	11	Swift & Greenfinch: -69%
Short-term (17–18) increases	7	Starling: 69%
Short-term (17–18) declines	14	Goldcrest: -56%

SWIFT DECLINE

Owing to their wide-ranging movements within the breeding season and weather-related influxes of non-breeding birds during the breeding season, **Swift** are a notoriously difficult species to monitor and therefore population change was not monitored by a standardised survey before BBS.

A 69% decline since 1995 has been detected and this does tally with the long-term relative abundance change recorded between 1988–91 and 2008–11 by the *Bird Atlas 2007–11*.

Swift almost exclusively nests in buildings: therefore a loss of nesting space could be having a toll on the population, with many of the holes used to access roof spaces for nesting blocked as homes become more energy efficient. Of course, little is known about any possible challenges the

species faces along migration routes or at wintering grounds of tropical and southern Africa, or the possible changes in the availability of aerial invertebrate food resources.

GREAT NEWS

Great Spotted Woodpecker have increased by 201% between 1995 and 2017 in Wales. The *Bird Atlas 2007–11* identified a range expansion from the core population in England spreading north and west through Scotland and Wales.

Historically, increases have been linked to Dutch elm disease and severe storms which provided more standing dead wood, in turn providing an increase in nest-site availability and insect prey associated with dead wood, although evidence for this is sparse and pre-dates BBS monitoring. Other theories behind the increase are

decreased nest competition from the declining **Starling** population, (down by 68% in Wales long-term), increased nest survival in **Great Spotted Woodpecker**, and their ability to exploit supplementary food available at garden feeding stations.

GLOBALLY NEAR-THREATENED

A decline of 68% has been recorded for **Curlew** in Wales between 1995 and 2017. In the UK as a whole, the decline was 48% during the same time period. The UK holds around 28% of the European population. It is classified as Globally Near-Threatened, and is on the UK Red List of *Birds of Conservation Concern*.

There is good evidence that one of the main reasons for decline is a loss of suitable breeding habitat due to afforestation of marginal hill land and drainage of upland moor, in-by and lowland pastures.

An increase in generalist predators is thought to be reducing breeding success and there is the added influence of climate change, which

Table 5 Trends in Wales during 2017–18, 2007–17 and 1995–2017

Species	Min. sample	1-year (17–18)	10-year (07–17)	22-year (95–17)	LCL	UCL
Canada Goose	32	-12	47 *	433 *	168	1,316
Mallard	73	-19	0	-12	-52	53
Pheasant (Grey Heron)	106	1	11	55 *	6	113
Red Kite	44	-16	-2	0	-39	51
Buzzard	32	20	139 *	422 *	182	998
Curlew	154	-14	-6	-3	-20	17
Feral Pigeon	31	-51 *	-44 *	-68 *	-80	-51
Stock Dove	38	-19	14	42	-10	106
Woodpigeon	35	28	29	46	-15	156
Collared Dove	207	3	-9	19	-1	40
Cuckoo	80	8	-17	28	-12	102
Swift	63	60 *	16	-20	-46	4
Gt Spotted Woodpecker	66	-41 *	-50 *	-69 *	-78	-52
Green Woodpecker	94	22	26 *	201 *	133	297
Jay	47	-13	-12	-20	-50	29
Magpie	82	43 *	17	49 *	18	115
Jackdaw	175	2	-14 *	-27 *	-38	-14
Rook	153	5	-15	9	-31	84
Carrion Crow	81	-20	-51 *	-60 *	-72	-43
Raven	223	5	-6	6	-14	30
Coal Tit	102	5	-10	35	-4	127
Blue Tit	82	10	2	-25	-45	5
Great Tit	195	27 *	-16 *	0	-12	15
Skylark	187	31 *	-17 *	22 *	4	43
Swallow	111	-18 *	-4	-11	-26	10
House Martin	188	-12	-20 *	15	-9	48
Long-tailed Tit	93	-20	-26	-12	-36	16
Willow Warbler	67	-36 *	-8	13	-19	57
Chiffchaff	171	-28 *	3	-15	-29	7
	159	-20 *	41 *	69 *	43	104

Species	Min. sample	1-year (17–18)	10-year (07–17)	22-year (95–17)	LCL	UCL
Blackcap	142	21 *	66 *	153 *	105	221
Garden Warbler	61	-6	-9	-25	-51	10
Whitethroat	92	-3	-10	-28 *	-44	-3
Goldcrest	91	-56 *	-1	-46 *	-62	-9
Wren	217	-18 *	17 *	30 *	16	44
Nuthatch	80	14	11	37 *	9	74
Treecreeper	44	-25	19	22	-13	84
Starling	82	69 *	-32 *	-68 *	-80	-49
Blackbird	217	-2	-1	42 *	30	53
Song Thrush	182	-33 *	-7	27 *	12	44
Mistle Thrush	109	32 *	3	5	-18	35
Robin	211	-21 *	3	14 *	3	29
Redstart	69	-10	12	8	-15	36
Stonechat	43	-37 *	-3	173 *	79	346
Wheatear	58	-9	-31 *	-42 *	-56	-22
House Sparrow	139	12	9	82 *	50	132
Duncock	170	-8	0	35 *	15	61
Grey Wagtail	33	-52 *	2			
Pied Wagtail	128	0	-6	3	-18	26
Meadow Pipit	97	-19 *	-7	-9	-28	15
Tree Pipit	36	-2	-6	-20	-49	16
Chaffinch	215	6	-25 *	-29 *	-39	-19
Bullfinch	69	-35 *	5	-2	-23	26
Greenfinch	112	-16	-76 *	-69 *	-78	-58
Linnet	100	-8	11	-18	-42	15
Lesser Redpoll	34	5	13			
Goldfinch	147	9	24 *	93 *	53	141
Siskin	32	-22	40	63	-7	250
Yellowhammer	32	-11		-62 *	-77	-45
Reed Bunting	31	-30	11	43	-7	141

appears to be pushing **Curlew** to higher latitudes and altitudes as average summer temperatures warm. For more on this, see page 12.

Further research is needed to investigate pressures faced by **Curlew** throughout the year. A major knowledge gap is how activities in areas used by **Curlews** outside of the breeding season, such as the management of coastal areas in relation to human development and recreational disturbance, might carry over to affect the breeding population.

Tracking technologies are playing a part in the investigations to find out more both within and beyond the breeding season.



Northern Ireland – population trends

Woodpigeon
increased by
100%
in Northern Ireland
between 1995
and 2017

Data from 117 BBS squares contributed to the long-term data set for Northern Ireland and were used in these latest trends. Trends were calculated for 37 species and are reported here in 22-, 10- and one-year time periods with five-year trends available online. These shorter-term trends allowed an additional three species to reach the reporting threshold.



originally spread from pigeons and doves and began to infect **Greenfinch**. *Trichomonas* is a protozoan parasite that causes nodules in the throat and prevents the host from feeding. Infected birds are often found around feeders looking unwell, with wet faces as the parasite causes drooling, and fluffed-up feathers. There is no cure but disinfecting bird feeders regularly is believed to reduce the risk of the infection spreading.

BLACKBIRD BOUNCE BACK

The predecessor survey to the BBS – the Common Birds Census – recorded a decline in **Blackbird** abundance from the 1970s to 1990s across the UK.

Reasons for this are largely unknown and declines were seen in both farmland and woodland habitats, though the decline was steeper in farmland. The decline is thought to have started in 1976 following a short but severe cold spell, followed by a shallow downward trend possibly related to average lower winter temperatures. Therefore, the increase of 43% from 1995 to 2017 represents a recovery from the prior decline.

PIGEONS AND DOVES

Both **Woodpigeon** and **Collared Dove** populations have doubled over the last 22 years, by 100% and 110% respectively (1995–2017). While population increases in **Woodpigeon** appear to have slowed in the last 10 years (18% from 2007 to 2017), **Collared Dove** continued to increase at almost the same rate over the last 10 years (+43%) as they have throughout the 22 years of BBS monitoring in Northern Ireland.

STATISTICALLY SIGNIFICANT RESULTS

Period	No. species	Greatest change in NI trends	
Long-term (95–17) increases	16	Blackcap:	1,468%
Long-term (95–17) declines	2	Greenfinch:	-75%
Short-term (17–18) increases	1	Coal Tit	26%
Short-term (17–18) declines	9	Bullfinch:	-35%

TREND PROVIDES A BUZZ

After severe persecution of **Buzzard**, and raptors in general across all of Ireland through the 19th century, numbers declined until the species was driven to extinction by the end of the century.

As persecution slowly became less prevalent, and possibly due to the removal of organochlorine pesticides such as DDT and dieldrin (which are known to have negatively affected some raptors) from general use in agricultural practices, **Buzzard** populations started to recover across

Britain and the species was able to recolonise Ireland.

This is reflected in the long-term trend for **Buzzard** in Northern Ireland – a 1,302% increase between 1995 and 2017. It appears, however, the rate of increase is slowing over time, with an increase of 35% over the last 10 years (2007–2017).

GREENFINCH DISAPPEAR

Greenfinch have undergone a 75% decline from 1995 to 2017. The main driver of the decline is a disease called trichomonosis that is thought to have

Table 6 Trends in Northern Ireland during 2017–18, 2007–17 and 1995–2017

Species	Min. sample	1-year (17–18)	10-year (07–17)	22-year (95–17)	LCL	UCL
Mallard	39	10	18			
Pheasant	43	-25 *	-20 *	105 *	16	406
Buzzard	34	1	35 *	1,302 *	572	4,116
Woodpigeon	87	5	18 *	100 *	58	175
Collared Dove	37	11	43 *	110 *	32	429
Magpie	85	-7	-16 *	-1	-29	35
Jackdaw	79	-12	21 *	74 *	41	153
Rook	75	-9	-20	-20	-41	19
Hooded Crow	84	-23 *	46 *	166 *	95	237
Coal Tit	66	26 *	-22 *	30	-18	94
Blue Tit	79	16	-11	7	-26	49
Great Tit	76	-1	-4	126 *	82	192
Skylark	31	-8		-47 *	-64	-34
Swallow	86	-11	-31 *	-10	-34	29
House Martin	47	5	41 *	98 *	12	255
Willow Warbler	82	-28 *	5	48 *	17	84
Chiffchaff	36	-14	14	5	-24	41
Sedge Warbler	30	-31	-44 *			
Blackcap	44	-5	180 *	1,468 *	969	2,577

Species	Min. sample	1-year (17–18)	10-year (07–17)	22-year (95–17)	LCL	UCL
Goldcrest	47	-20 *	-34 *	33	-7	118
Wren	94	-13 *	6	77 *	32	126
Starling	81	1	-6	28	-8	104
Blackbird	89	2	4	43 *	11	80
Song Thrush	80	-5	3	64 *	19	115
Mistle Thrush	60	6	-22 *	-9	-59	69
Robin	91	-9 *	5	25	-4	52
House Sparrow	58	-3	11	34	-14	179
Dunnock	72	0	-5	68 *	7	157
Pied Wagtail	48	-29 *	6	49	0	139
Meadow Pipit	64	-19 *	-13	12	-21	71
Chaffinch	93	-2	-4	33 *	4	54
Bullfinch	34	-35 *	15	21	-17	68
Greenfinch	36	-12	-84 *	-75 *	-85	-51
Linnet	36	2	-51 *	-17	-51	28
Lesser Redpoll	30	-14	-51 *			
Goldfinch	54	6	26 *	455 *	263	1,282
Reed Bunting	33	-13	-24	-23	-50	29

INTERPRETING THE RESULTS: see page 13

TREND TABLES ONLINE: www.bto.org/bbs-tables

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 were collected in an impressive 22 squares in total.

Channel Islands

Although square coverage fell in 2018, 18 squares were covered and these surveys provided counts for 82 bird species. As always, the Channel Islands contributed Short-toed Tropicbird to the species list and, as a bonus for 2018, Glossy Ibis.

Of course, the common and widespread species are the target for BBS, and the Channel Islands provided data for 63 bird species that are included in the UK BBS trends. Detection Type was recorded on ten squares, helping to build a picture of which species might be underrecorded, and one square contributed Colony data.

Thanks to the dedicated volunteers who took part in the BBS on the Channel Islands in 2018.

Isle of Man

The BBS presence on the Isle of Man continues to grow with mentoring and training days now taking place, along with increased promotion of the survey. Four squares were covered in 2018 and all recorded Detection Type. Forty-four bird species were recorded, from the numerous Herring Gull and Jackdaw, to the much rarer Peregrine, seen once. Of these 44 species, 37 are part of the UK BBS trends and two squares included Colony data.

All data collected on all squares are valuable, whether used in the trends or other research such as distribution work or population estimates.

Many thanks to the volunteers and Regional Organiser for keeping the Isle of Man on the map!

English regions – population trends

487
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. Population trends have been calculated for nine English regions, covering 79 species. A summary of each region's trends and coverage is displayed in Table 7.

Long-term trends (1995–2017) are provided in Table 8, along with an indication of whether the trend is statistically significant and 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. It is striking to see regional variations for some species. For example, **Chiffchaff** has increased long-term by 37% increase in the South West and 413% in the East Midlands! In future, as coverage increases, the aim is to be in a position to report regional trends for other countries within the UK.

TREND GAINS

Overall, the number of long-term trends reaching the reporting threshold has increased from 482 in 2017 to 487 in 2018. Species have joined the trends for some regions: **Buzzard**, **Great Spotted Woodpecker** and **House Martin** in the North East, **Coot** in the East Midlands, **Raven** in the West Midlands and **Bullfinch** in Yorkshire & Humber.

...AND LOSSES

However, the sample size is now too small to report a long-term trend for **Grey Partridge** in the South East.

SIGNIFICANT INCREASES

Buzzard featured heavily as the species to have undergone the largest increase in the most English regions: North East (+6,421%), East Midlands (+1,829%) and East of England (+22,058%). Another raptor, **Red Kite**, was the species to show the largest increase in the South East (+16,797%) and this region was the only one able to produce a 22-year trend for the species.

Different species were responsible for the largest significant increases in each of the five remaining regions. Perhaps unsurprisingly it was **Ring-necked Parakeet** for London (+24,652%).

For the North West it was **Chiffchaff** (+348%) – although the species itself increased the most in the East Midlands (+413%); for Yorkshire & Humber it was **Greylag Goose** (+924%); the West Midlands, **Goldfinch** (+239%) – although this time, London recorded the largest

increase for **Goldfinch** across English regions (+463%).

Finally, in the South West, **Great Spotted Woodpecker** underwent the largest long-term increase of 130% in the region. It also increased substantially in the North East (+155%), the East Midlands (+168%) and the West Midlands (+142%).

SIGNIFICANT DECLINES

For three regions, **Cuckoo** was the species to have undergone the largest decline long-term (1995–2017); East Midlands (-83%), West Midlands (-77%) and the South West (-82%).

For the East of England (-94%) and South East (-96%), **Turtle Dove** suffered the largest declines. In the North West (-68%) and North East (-70%) **Swift** was the species to have undergone the largest decline.

In the two remaining regions - Yorkshire & Humber, and London – the largest declines seen were for **Grey Partridge** and **House Sparrow** respectively, both with a 70% decline between 1995 and 2017.

Table 7 Counties in each region, coverage in 2018, trends produced and statistically significant changes

Region	Counties	Number of squares covered in 2018	No. of trends	Significant increases	Significant declines
1 North West	Cheshire, Cumbria, Lancashire, Greater Manchester, Merseyside	257	57	20	14
2 North East	Cleveland, County Durham, Northumberland	140	39	8	7
3 Yorkshire & Humber	East Yorkshire, North Lincolnshire, North Yorkshire, South Yorkshire, West Yorkshire	306	56	22	8
4 East Midlands	Derbyshire, Northamptonshire, Leicestershire & Rutland, Lincolnshire, Nottinghamshire	303	58	20	10
5 East of England	Bedfordshire, Cambridgeshire, Essex, Hertfordshire, Norfolk, Suffolk	403	68	22	20
6 West Midlands	Birmingham, Herefordshire, Shropshire, Staffordshire, Warwickshire, Worcestershire	216	54	19	14
7 South East	Berkshire, Buckinghamshire, Hampshire, Isle of Wight, Kent, Oxfordshire, Surrey, Sussex	691	67	22	25
8 South West	Avon, Cornwall, Devon, Dorset, Gloucestershire, Somerset, Wiltshire	570	61	17	13
9 London	Greater London	97	27	13	8

Table 8 Trends in English regions during 1995–2017

Species	North West		North East		Yorkshire & Humber		East Midlands		East of England		West Midlands		South East		South West		London	
	95–17	Sample	95–17	Sample	95–17	Sample	95–17	Sample	95–17	Sample	95–17	Sample	95–17	Sample	95–17	Sample	95–17	Sample
Canada Goose	154 *	73			132 *	34	22	44	33	60	16	72	46 *	125	88	52		
Greylag Goose					924 *	42	773 *	32	96 *	50			111 *	41				
Mute Swan									98	43			-27	58	36	37		
Shelduck									3	36								
Mallard	18	161	56	34	22	109	16	110	-4	195	44 *	120	24	246	34 *	161	-23	44
Tufted Duck													55	31				
Red Grouse					20	51												
Red-legged Partridge					13	54	-53 *	78	-16	182	9	36	96 *	127	129 *	62		
Grey Partridge					-70 *	30	-36 *	32	-54 *	43								
Pheasant	161 *	147	30	73	68 *	156	-3	162	-13	283	73 *	144	28 *	406	62 *	289		
(Grey Heron)	-24 *	79			3	37	-22	52	-43 *	83	6	59	-20	128	-18	85		
(Cormorant)									-19	49			54	52	-19	33		
Sparrowhawk	-37 *	33							-27	46			-30 *	67	-19	49		
Red Kite													16,797*	80				
Buzzard	92 *	79	6,421*	30	670 *	43	1,829*	64	22,058*	77	196 *	103	1,123 *	184	16	238		
Moorhen	-6	70			7	40	-34 *	61	-22 *	126	-23 *	61	-36 *	145	-9	70		
Coot	-17	31					23	30	-16	39	103	31	2	66				
Oystercatcher	-4	62			266 *	50			67 *	34								
Lapwing	-28 *	116	-19	47	3	112	-38 *	62	-40 *	74	-39 *	39	-59 *	101				
Curlew	-51 *	92	-28 *	50	11	116												
Snipe					170 *	39												
Feral Pigeon	-36 *	76			-52 *	63	-41	50	-30	77	-40	43	-18	111	-31	69	-22 *	74
Stock Dove	58 *	60			76 *	58	-2	80	11	148	69 *	88	45 *	215	32 *	135		
Woodpigeon	89 *	221	18	87	93 *	180	41 *	200	30 *	330	24 *	186	24 *	505	53 *	364	52 *	84
Turtle Dove									-94 *	57			-96 *	41				
Collared Dove	8	135	-23	34	-28 *	84	34	113	37 *	211	-32 *	117	-3	303	-5	199	-17	53
Cuckoo	-40 *	33			-58 *	44	-83 *	48	-73 *	104	-77 *	51	-74 *	159	-82 *	72		
Swift	-68 *	107	-70 *	33	-53 *	86	13	82	-43 *	151	-56 *	74	-57 *	171	-59 *	145	-58 *	59
Gt Spotted Woodpecker	120 *	90	155 *	30	85 *	53	168 *	65	58 *	152	142 *	111	78 *	323	130 *	176	39 *	39
Green Woodpecker							237 *	50	92 *	174	54	66	18 *	318	-3	135	35 *	32
Kestrel	-30 *	71			-33	62	15	67	-5	111	-31 *	42	-31 *	136	-49 *	78		
Ring-necked Parakeet													590 *	35			24,652*	46
Jay	23	71					18	34	30 *	121	-27 *	64	-13 *	243	-2	114	-20	41
Magpie	-13 *	187	-17	37	-23	105	44	152	26 *	249	-9	165	5	430	-10	302	36 *	82
Jackdaw	75 *	148	5	65	57 *	126	160 *	130	129 *	232	100 *	144	71 *	389	43 *	288		
Rook	-35	90	-29	49	-21	114	8	102	11	182	-7	89	-1	261	-26 *	228		
Carrion Crow	46 *	230	-10	84	40 *	184	38 *	189	83 *	308	11	184	21 *	489	14	360	51 *	83
Raven											109 *	30			6	79		
Coal Tit	52 *	74	35	43	39	48	14	41	-2	68	40 *	51	8	159	25	108		
Marsh Tit													-39 *	52	-1	30		
Blue Tit	-9	208	-16	67	-10	158	36 *	185	19 *	309	-6	184	-9 *	492	-10	347	5	82
Great Tit	30 *	195	59 *	59	37 *	139	51 *	174	13 *	293	13	179	10 *	479	38 *	337	107 *	78
Skylark	-27 *	121	-24 *	72	-1	155	-18	162	-28 *	281	-17 *	118	-28 *	322	-36 *	228		
Swallow	-14	200	-12	78	-18	165	59 *	156	-2	230	-13	147	10	331	15	309		
House Martin	0	99	-31	30	-1	70	62	59	-38 *	99	-43 *	81	-58 *	146	-35 *	153		
Long-tailed Tit	27	87			12	54	64 *	83	20	157	-13	90	-16	255	31 *	156	88 *	34
Willow Warbler	1	149	-30	70	-12	122	-58 *	94	-80 *	112	-58 *	90	-78 *	152	-62 *	153		
Chiffchaff	348 *	111	314 *	46	312 *	86	413 *	110	150 *	218	160 *	147	60 *	392	37 *	306	144 *	35
Sedge Warbler									-27	45			-10	35	-16	34		
Reed Warbler									-1	41			-25	34				
Blackcap	221 *	122	51 *	44	125 *	97	134 *	130	100 *	250	127 *	143	113 *	408	122 *	292	182 *	48
Garden Warbler	-16	30					-30	34	-39 *	59	-25	45	-39 *	99	-31 *	64		
Lesser Whitethroat					32	37	22	77	46	30	-25	58	-15	42				
Whitethroat	-4	89	44 *	42	2	87	72 *	142	5	255	14	109	34 *	306	5	217		
Goldcrest	90 *	48	76	30	102 *	32	66 *	79	115 *	48	34 *	206	-20	137				
Wren	65 *	220	24	80	49 *	183	37 *	191	34 *	305	33 *	181	15 *	483	14 *	356	42 *	78
Nuthatch	284 *	46							136 *	33	143 *	54	61 *	198	70 *	92		
Treecreeper									-16	30			-6	97	0	52		
Starling	-56 *	175	-47 *	61	-62 *	126	-40 *	134	-51 *	231	-69 *	130	-67 *	337	-71 *	195	-60 *	80
Blackbird	49 *	219	17	76	53 *	176	39 *	198	7	322	33 *	187	3	505	22 *	366	-30 *	84
Song Thrush	83 *	170	7	65	98 *	122	32 *	144	4	244	91 *	157	-2	439	17 *	305	-31 *	52
Mistle Thrush	-17	120	-8	41	-24 *	83	-1	85	-54 *	133	-14	89	-56 *	229	-46 *	129	-58 *	33
Robin	45 *	211	46 *	73	70 *	156	40 *	186	29 *	303	48 *	184	15 *	489	17 *	352	88 *	81
Wheatear	-37	53			-17	48												
House Sparrow	-12	162	-28	45	-5	103	10	124	-26 *	198	-8	144	-28 *	313	7	243	-70 *	70
Tree Sparrow	53	31			215 *	44	18	34										
Duncock	23 *	183	31	61	5	134	15	176	24 *	278	30 *	170	7	436	14	324	26	63
Yellow Wagtail							-52 *	38	-39 *	48								
Grey Wagtail															-22	32		
Pied Wagtail	-12	132	3	50	-11	108	-20	99	2	153	0	87	-19 *	205	-10	156		
Meadow Pipit	-6	91	-16	55	5	107	-51 *	41	-58 *	41	-45 *	182	-44 *	49	-29	49		
Chaffinch	-14 *	219	2	85	17	182	7	196	-11 *	321	-45 *	182	-32 *	489	-29 *	359	51	57
Bullfinch	-4	43			211 *	30	37	54	-9	66	17	56	-19 *	140	3	115		
Greenfinch	-49 *	152	-58 *	44	-58 *	103	-49 *	138	-48 *	249	-48 *	140	-64 *	375	-66 *	268	-53 *	58
Linnet	-20	93	-40 *	50	-19	99	-16	121	-9	177	-14	76	-31 *	229	-12	187		
Goldfinch	168 *	171	146 *	56	158 *	130	247 *	144	106 *	224	239 *	133	107 *	349	110 *	281	463 *	53
Corn Bunting									-35 *	39								
Yellowhammer	-40 *	53	-46 *	44	-23	90	-1	140	-24 *	222	-54 *	103	-42 *	251	-23 *	169		
Reed Bunting	5	66			86 *	47	35	66	40 *	84			-32 *	62	39	35		

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.



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Mammal monitoring and population trends

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

Mammal data were recorded in 88% of the 4,022 BBS squares surveyed. Here, population trends for the UK's most easily detected and widespread terrestrial mammal species are displayed with, as a new addition, 10- and one-year trends to match the bird trends format.

Mammal recording is an optional extra to the BBS bird surveys, so it is fantastic to have these data collected on such a large percentage of squares.

Trends are produced for 21-, 10-, five- and one-year periods. Five-year trends are available to view online at www.bto.org/bbs-mammals.

COUNTS, SIGNS AND NONE

The types of data collected include counts of live mammals, presence of live mammals on additional visits to the square, signs of mammals, records of dead mammals and records from local knowledge. This provides valuable information on population abundance and/or distribution. 'Null returns', where mammals and signs of mammals were looked for, but none were seen, are also an important part of BBS mammal recording.

Counts of live mammals seen during the official bird survey visits were submitted for 2,980 squares, indirect evidence such as landowner knowledge or signs was observed on 148 squares, and 'null returns' were received from 425 squares.

CHANGING RATES

With 10- and five-year trends produced for mammals as well as birds, we can see changes over time in more detail. **Reeves' Muntjac** have increased by 140% in the UK between 1996 and 2017. For the last 10 years, the increase has been recorded as 37% and the trend from 2012 to 2017 is an increase of 31% (all five-year trends are available online).

The graph opposite suggests that the rate of population growth has fluctuated over the years, with a slowing between 2007 and 2013, before increasing at a faster rate over the last few years.

UK-WIDE PATTERN

Rabbit shows a statistically significant decline across all countries and regions where the reporting threshold is met. For the four deer species monitored, the opposite is true; almost all statistically significant trends across countries and regions, where the reporting threshold is met, show increases. The only exception is **Roe Deer** in Scotland, where a decline of 25% was recorded between 2017 and 2018.

RED FOX

The long-term index for **Red Fox** has reached a new low, with the trend showing a decline of 42% between 1996 and 2017 across the UK as a whole. Both the 10- and five-year trends show declines, of 28% and 25% respectively.

For countries and regions reaching the reporting threshold, **Red Fox** shows declines across the board. These trends may however, mask habitat-specific differences *e.g.* between urban and rural habitat types, especially for species such as **Red Fox** which have taken readily to urban environments and may behave differently in the two environments.

THERE'S MORE!

BBS results for Mountain Hare and Grey Squirrel are explored more fully on pages 30–31.

Rabbit declined by **62%** in the UK between 1996 and 2017

Table 9 All mammal species recorded in 2018

Species	Squares recorded
Brown Hare	985
Mountain/Irish Hare	93
Rabbit	1,825
Grey Squirrel	1,199
Red Squirrel	35
Water Vole	5
Field Vole	26
Bank Vole	28
Yellow-necked Mouse	1
Wood Mouse	18
House Mouse	7
Brown Rat	46
Lesser White-toothed Shrew	1
Common Shrew	26
Pygmy Shrew	5
Mole	550
Hedgehog	34
Wild Boar	5
Bottle-nosed Dolphin	1
Harbour Porpoise	3
Roe Deer	843
Red Deer	161
Sika Deer	19
Fallow Deer	124
Reeves' Muntjac	270
Chinese Water Deer	16
Park Cattle	6
Feral Goat	9
Serotine Bat	1
Daubenton's Bat	2
Natterer's Bat	2
Noctule Bat	3
Common Pipistrelle	1
Soprano Pipistrelle	2
Pipistrelle bat sp	11
Brown Long-eared Bat	3
Domestic Cat	308
Red Fox	509
Grey Seal	8
Common Seal	6
Otter	24
Pine Marten	13
Badger	283
Stoat	58
Weasel	25
Polecat	2
American Mink	4

▲ 'Squares recorded' include counts of live mammals, field signs, dead mammals and local knowledge.

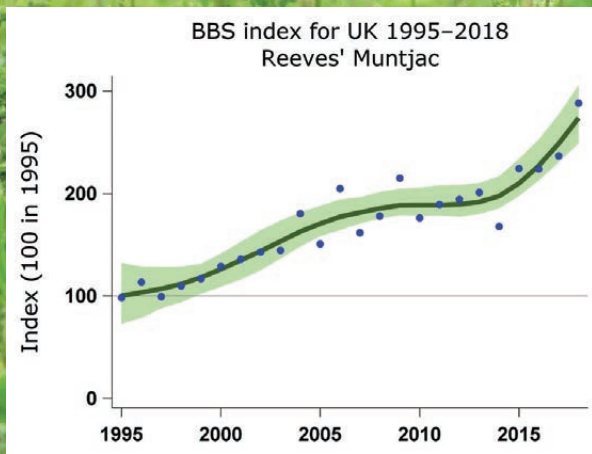
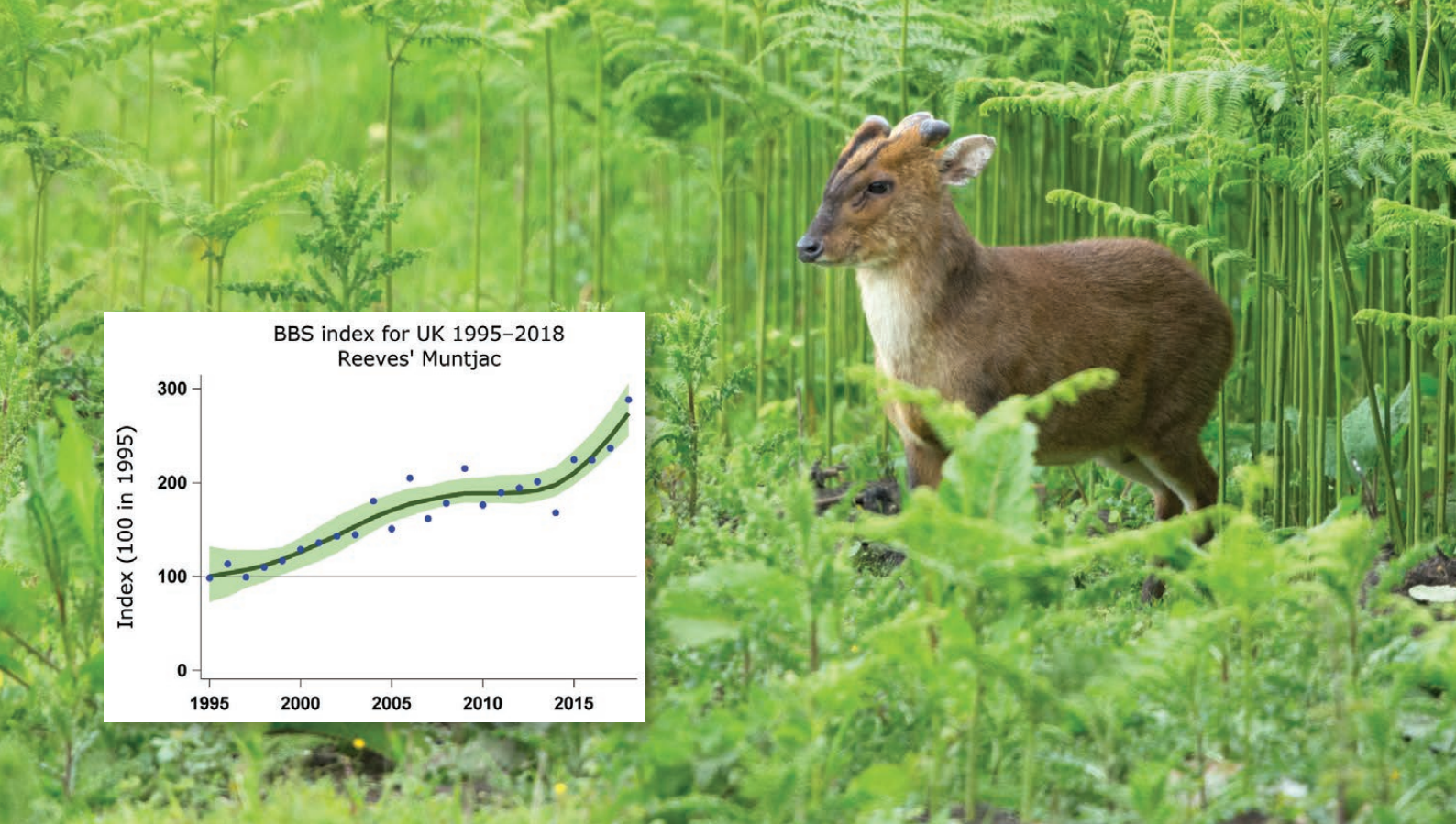


Table 10 Mammal trends in UK

Species	Min. sample	1-year (17-18)	10-year (07-17)	21-year (96-17)	LCL	UCL
Brown Hare	729	1	-7	-8	-17	3
Mountain/Irish Hare	53	7	28	-38	-59	6
Rabbit	1,448	-14 *	-41 *	-62 *	-68	-54
Grey Squirrel	774	-5	-6 *	7	-4	15
Roe Deer	449	-8	25 *	80 *	54	106
(Red Deer)	67	2	-10	3	-14	23
(Fallow Deer)	64	10	7	19 *	2	48
Reeves' Muntjac	105	22 *	37 *	140 *	64	275
Red Fox	283	-5	-28 *	-42 *	-50	-32

Table 11 Mammal trends in England

Species	Min. sample	1-year (17-18)	10-year (07-17)	21-year (96-17)	LCL	UCL
Brown Hare	622	2	-12 *	-8	-17	1
Rabbit	1,188	-23 *	-43 *	-49 *	-56	-41
Grey Squirrel	691	-1	-5	6	-5	18
Roe Deer	347	11	12 *	76 *	48	114
(Fallow Deer)	60	9	8	19	0	40
Reeves' Muntjac	105	22 *	37 *	140 *	60	254
Red Fox	228	-12	-36 *	-48 *	-55	-39

Table 15 Mammal trends in English regions

Species	North West		North East		Yorkshire & Humber		East Midlands		East of England		West Midlands		South East		South West		London	
	96-17	Sample	96-17	Sample	96-17	Sample	96-17	Sample	96-17	Sample	96-17	Sample	96-17	Sample	96-17	Sample	96-17	Sample
Brown Hare	-45 *	63			1	75	27	93	2	147	-27 *	41	-31 *	102	-14	73		
Rabbit	-39 *	109	-68 *	41	-18	119	-88 *	112	-48 *	207	-57 *	111	-65 *	295	-37 *	184		
Grey Squirrel	88 *	60			-19	35	29	47	-5	101	-21	76	-3	209	28	105	46 *	51
Roe Deer					154 *	33							78 *	124	45 *	103		
Reeves' Muntjac									131 *	49			80 *	34				
Red Fox									-21	31			-33 *	65	-54 *	46		

Table 12 Mammal trends in Scotland

Species	Min. sample	1-year (17-18)	10-year (07-17)	21-year (96-17)	LCL	UCL
Brown Hare	80	-2	1	-11	-42	16
Rabbit	115	6	-41 *	-82 *	-89	-73
Roe Deer	101	-25 *	46 *	87 *	46	162
(Red Deer)	46	-8	-17	-16	-38	5

Table 13 Mammal trends in Wales

Species	Min. sample	1-year (17-18)	10-year (07-17)	21-year (96-17)	LCL	UCL
Rabbit	94	-15	-47 *	-52 *	-66	-15
Grey Squirrel	58	-15	3	14	-15	52

Table 14 Mammal trends in Northern Ireland

Species	Min. sample	1-year (17-18)	10-year (07-17)	21-year (96-17)	LCL	UCL
Rabbit	45	-3	1	-35	-62	3

NOTE:

Trends are displayed in the same way as they are for the bird trends. Page 13 covers interpreting trends.

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.

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

Mammal mapping

BBS data reveal interesting patterns of change in mammal abundance in different areas of Great Britain.

By **Dario Massimino**, Research Ecologist, BTO

Since 1995, volunteers have had the option of recording mammals during visits to their BBS squares and in 2018, 88% of observers recorded mammals as an integral part of their BBS surveys. This provides incredibly useful data on the distribution and population change of common mammal species and for many years we have been reporting the population trends of nine species (see page 29).

OPTING IN FOR MAMMALS

In 2018 we took the analysis of BBS mammal data one step further. By analysing the mammal count data in relation to habitat and location, we produced maps of mammal relative abundance and population trends for these same nine species. For each species, we produced three maps: a pair showing how abundance varied across Great Britain in 1995–99 and in 2011–15, and a third highlighting the differences between these two maps. The last map reveals how relative abundance has changed across Great Britain between 1995 and 2015. We show here maps for the Mountain Hare, the only lagomorph native to Britain, and Grey Squirrel, one of the most best-known invasive species.

MOUNTAIN HARE CHALLENGE

The Mountain Hare abundance map shows that the core areas (coloured in dark blue) of this species are in Scotland, mainly in the Grampian Mountains. Much smaller areas are shown in England, where we know the species is present in the Peak District. Our map also shows some blue specks in the northern Pennines and in the North York Moors, areas where we know the species to be absent. This highlights a common problem with modelling of this kind. The statistical models look at BBS squares and identify features (*e.g.* presence of certain habitats) that are associated with high or low numbers of Mountain Hares. The models then extrapolate to unsurveyed squares and make predictions of how many Mountain Hares might be present in relation to the habitats, elevations and climate of each square. By this process the models erroneously judge the northern Pennines and North York Moors to be suitable. Although

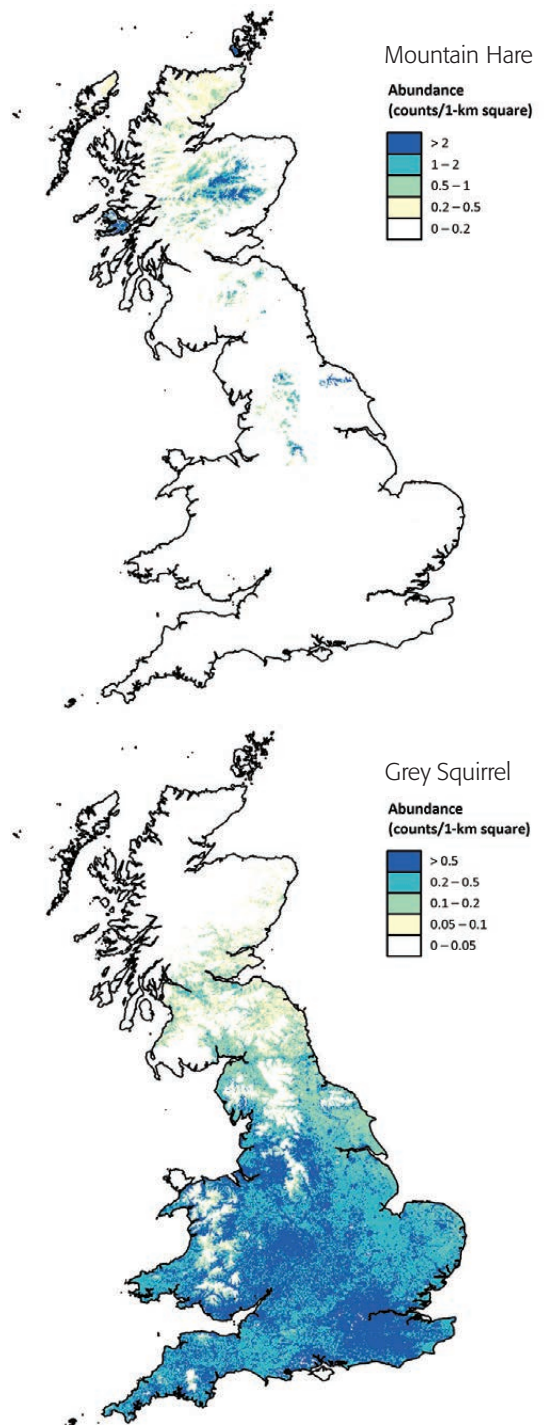


Figure 4 Map of relative abundance of **Mountain Hare** (top) and **Grey Squirrel** (bottom) covering 2011 to 2015. Darker colours show higher abundance.

the models try to balance suitability and proximity to occupied areas, in this specific case the models could benefit from further improvement.

The change map shows how the Mountain Hare's estimated population trends vary across Great Britain. Large parts of the species' core range are coloured in red, indicating that we have lost more than half of the hare population since the late 1990s. The grey dots show the areas where there isn't consistent evidence of a positive or negative trend. Lack of evidence does not necessarily mean that the species is stable there; it can also mean that we don't have enough data to prove that there is a trend. Unfortunately the core areas of the Mountain Hare

are among the least sampled by the BBS so even large declines may be classified as ‘statistically not significant’ because of the scarcity of data. This shows the importance of surveying in remote areas and highlights the enormous value of surveying a square in an isolated upland area, such as through the Upland Rovers scheme.

GREY SQUIRREL ‘STABILITY’?

The Grey Squirrel is an invasive species that was introduced to Britain in the 1870s and since then has colonised most of Great Britain except northern Scotland.

According to the UK-level trends based on BBS data, this species has not shown significant increases during 1995–2018. This apparent stability conceals population dynamics that are unmasked by our maps: while the Grey Squirrel population is stable in most of its core areas in England (here the grey dots are more likely to indicate a stable population as these areas are well covered by the survey), increases are evident in the peripheral populations and especially in the central lowlands of Scotland where the dark blue dots show the species has more than doubled during the study period. This is a worrying finding because Scotland represents the core of the remnant range of the native Red Squirrel in Britain. Increasing pressure from the Grey Squirrel through competition and disease transmission is likely to cause further reductions in the remainder of the Red Squirrel’s populations.

FINE DETAIL

These two example species show the importance of investigating population trends not only for a whole country but also at a much finer scale. The maps resulting from these analyses show where particular population changes are occurring and this information is crucial to stimulate further research and conservation actions.

In this study we selected species that are easily detectable during daytime counts. Species that have more nocturnal habits or are too rare or too difficult to detect would need different survey methods and therefore cannot be properly monitored by a programme such as the Breeding Bird Survey, which is mainly targeted at counting diurnal birds. However, for easily detectable species, the BBS has proved to be an excellent source of data on mammals and is currently the only survey in Britain that allows us to produce maps of relative abundance change. We really hope that BBS volunteers continue with the excellent job they have done so far and the uptake of mammal recording remains as high as it has been to date.

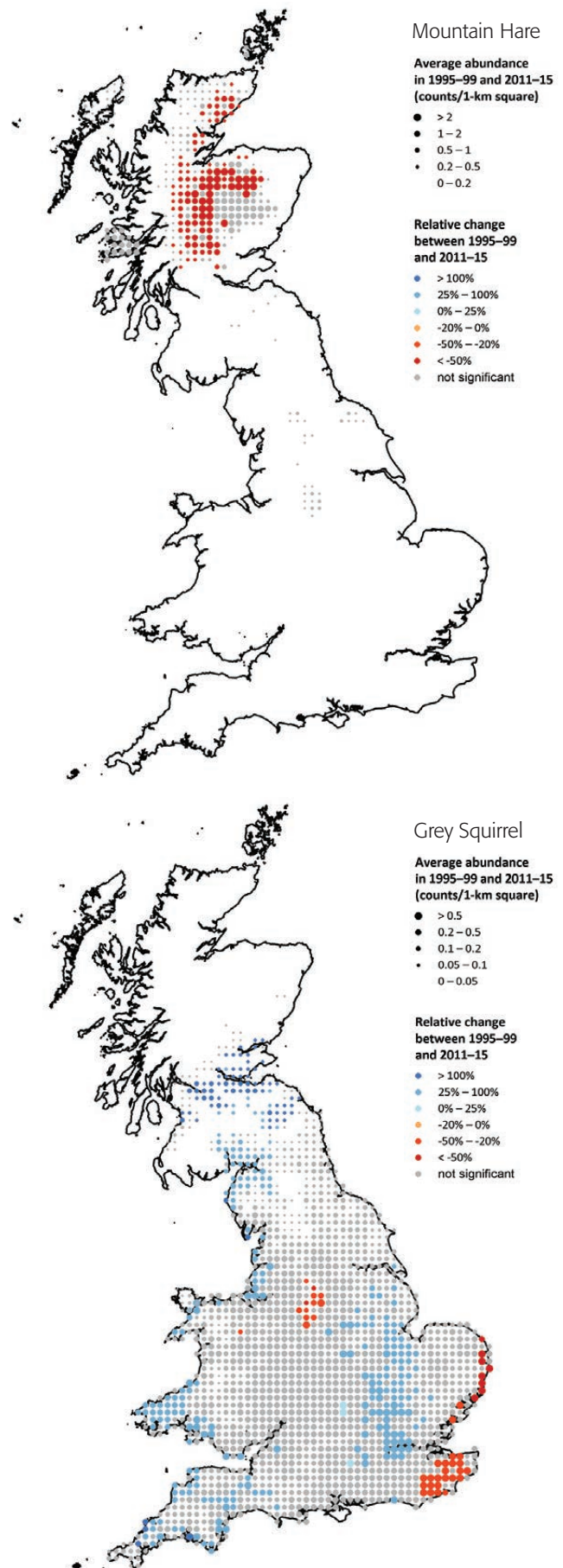


Figure 5 Map of population trend of Mountain Hare (top) and Grey Squirrel (bottom). Dots are sized according to the level of abundance and coloured according to the direction and magnitude of change (red = evidence of a decrease, grey = insufficient evidence of a trend, blue = evidence of an increase).

FIND OUT MORE...

Massimino, D., Harris, S.J. & Gillings, S. 2018. Evaluating spatiotemporal trends in terrestrial mammal abundance using data collected during bird surveys. *Biological Conservation*. 226: 153–167.

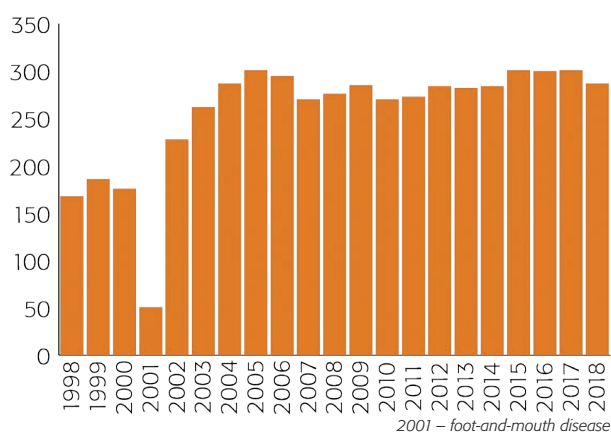


WBBS: BBS-style transects along waterways

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

Thanks to the 256 WBBS volunteers, 287 WBBS stretches were surveyed in 2018. All the data were entered ahead of the calculation of trends, including 19 paper submissions that arrived late. As always, we encourage data to be submitted, either via BBS Online or on paper, by the end of August.

Graph 3 Coverage of WBBS stretches (1998–2018).



Mallard were recorded on 93% of all WBBS stretches surveyed in 2018.

BBS ONLINE FOR WBBS

2019 saw the launch of the new look BBS Online system, incorporating data entry for WBBS. Functions on this system remain largely the same but the site has a fresher look. Further to this, historic data for WBBS have been uploaded into the main database, meaning all these data are now available to volunteers via the BBS Online system – a big step forwards, allowing volunteers to view their own submissions back to 1998, when the survey started.

IN THE MIX

In 2018, 163 bird species were recorded during WBBS visits, including the top five most widespread species: Wren which were recorded on 95% of stretches, Chaffinch and Woodpigeon on 94%, and Blackbird and Mallard on 93% of stretches.

At the scarcer end of the scale were species for which only one sighting was submitted, such as Golden Eagle, Goshawk, Crane and Lesser Spotted Woodpecker. You never know what you might see while out surveying. All records submitted are of value, from those used directly in the trends, to those requested by County Recorders and those made available to research projects.

Thirty-nine stretches had over 50 bird species recorded along them, with a 5-km stretch along the Gloucester and Sharpness Canal resulting in a species count of 74. Only three stretches had fewer than 10 bird species recorded in them and the average number of bird species along all waterways surveyed in 2018 was 38. It all counts – thank you to everyone who took part.

METHOD AND PURPOSE

Methods are similar to the Breeding Bird Survey, but there are some differences. Rather than two 1-km 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.

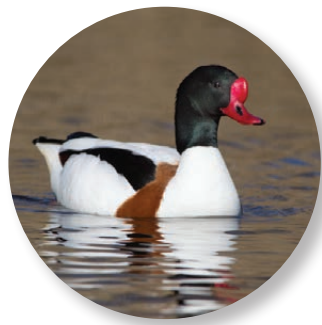
The survey is especially valuable for monitoring the population trends of species strongly associated with linear waterways, as included in the trends on pages 34 and 35.

COVERAGE

The Waterways Breeding Bird survey started in 1998 and has remained fairly stable since 2004 (Graph 3). A limitation to the survey is that currently there is no way of creating new WBBS stretches using the same stratified sampling technique as previously. Work is ongoing to develop a new approach that properly accounts for waterways but in the meantime, existing stretches across the UK remain unallocated and available for surveying.

As with the BBS, upland and remote areas are the biggest challenge to cover. However, given the smaller scale of the WBBS, coverage for this survey is by and large, well distributed.

Areas of Scotland, Northern Ireland, mid Wales and some of the east coast of England have obvious gaps. There are currently no stretches available to survey on the Isle of Man or Channel Islands and this might be something a new method of selecting survey sites could put right.



THRESHOLDS

For some species, the average number of sites recorded is just below the reporting threshold (Table 16). With increases in a combination of coverage or species distribution and abundance, it may be possible to report trends for these species in the future.

Species	Sample
Shelduck	26
Redshank	21
Mandarin	24
Great Crested Grebe	21
Snipe	20
Gadwall	21
Little Grebe	17

Table 16 Additional species of interest for WBBS but for which sample size is currently just too low to calculate robust trends from the survey.



United Kingdom – WBBS population trends

Coot
declined by
41%
along UK waterways
between 2007
and 2017

The WBBS produces trends for 24 bird species associated with waterways, providing an indication of the health of bird populations in this habitat type specifically, rather than for all UK habitat types overall, as in the Breeding Bird Survey trends. The addition of shorter-term trends of the last 10-, five- and one-year periods provide an insight into population changes through time along linear waterways.

STATISTICALLY SIGNIFICANT RESULTS

Period	No. species	Greatest change in WBBS trends
Long-term (99–17) declines	9	Sedge Warbler: -61%
Short-term (17–18) declines	5	Whitethroat & Pied Wagtail: -24%

Of the 24 long-term (1999–2017) trends produced in 2018, nine were statistically significant. Twelve of the 10-year trends were statistically significant as were five of the one-year trends.

All of the statistically significant trends, for 1999–2017, 2007–2017 and 2017–2018, show declines. The five-year trends (available online) for the most part follow this pattern, with all but one statistically significant trend showing a decline. The exception was **Grey Wagtail**, with an increase of 31% between 2012 to 2017.

DOWNWARD SLIDE

Between 1999 and 2017, **Sedge Warbler** declined by 61% along waterways. This is the largest decline recorded by the survey and the 10-year

trend from 2007 to 2017 shows a 42% decline, in comparison with the 10-year Breeding Bird Survey (BBS) trend for **Sedge Warbler** across all habitat types in the UK of -18%.

Why some species show marked declines along waterways in contrast to trends in all habitats is unknown. In general, annual fluctuations seen in **Sedge Warbler** trends tend to relate to overwinter survival, influenced in part by rainfall levels in wintering grounds south of the Sahara.

MOORHEN DECLINES

Since 1999, **Moorhen** declined by 27% along waterway habitats. This trend is mirrored by the BBS (-16% between 1995 and 2017) which measures trends for widespread

breeding birds across all habitat types and the Wetland Bird Survey (-26% between 2005/06 and 2015/16), which monitors the non-breeding populations of UK waterbirds.

Moorhen are known to be susceptible to cold weather, which could be the reason for the 13% decline between 2017 and 2018, due to the impact of the Beast from the East in February 2018.

There are two main theories behind the long-term decline of **Moorhen**: the spread of the waterway-specialising predator, **American Mink**, at least at a local level, and a reduction of the quantity and quality of farmland ponds.

Demographic trends for **Moorhen** show an increase in nest failure rates and a decline in fledglings per breeding attempt, suggesting that the pressures faced may be greatest during the breeding season.

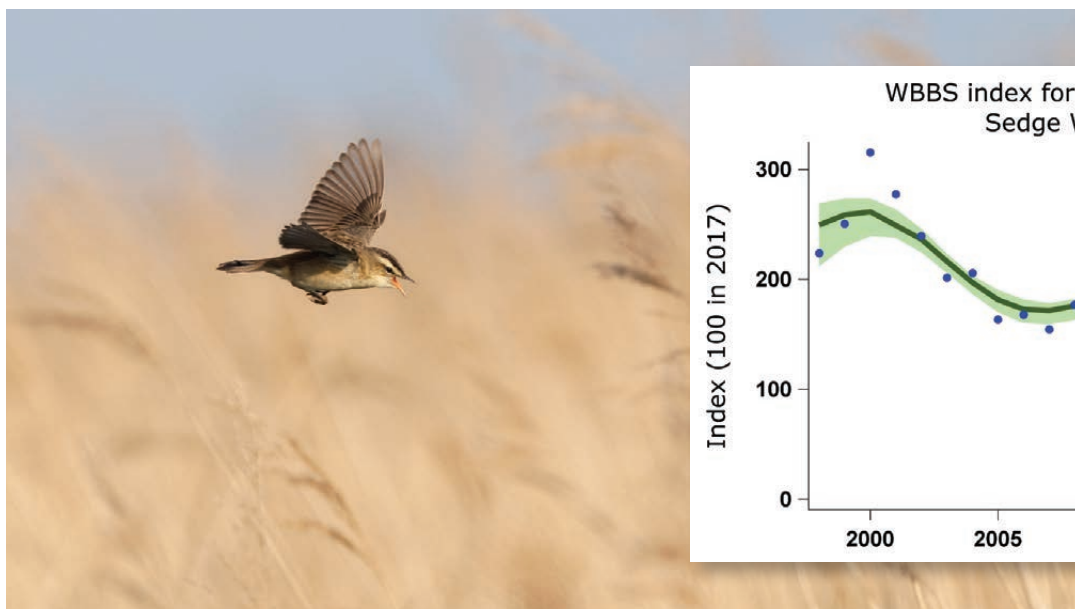




Table 17 WBBS UK population trends during 2017–18, 2007–17 and 1999–2017

Species	Min. sample	1-year (17–18)	10-year (07–17)	18-year (99–17)	LCL	UCL
Canada Goose	101	-19	-7	47	-7	150
Greylag Goose	55	2	24	63	-16	223
Mute Swan	113	33	-18 *	-10	-36	17
Mallard	236	-8 *	-12 *	-5	-15	5
Tufted Duck	44	-20	-50 *	-54 *	-72	-8
Goosander	54	12	36	32	-10	91
(Grey Heron)	176	-6	-22 *	-27 *	-37	-17
(Cormorant)	68	-55	28	13	-23	61
Moorhen	148	-13 *	-25 *	-27 *	-41	-15
Coot	70	-13	-41 *	-35	-63	2
Oystercatcher	76	-19	-21 *	-36 *	-50	-23
Lapwing	79	-14	-37 *	-58 *	-72	-39

Species	Min. sample	1-year (17–18)	10-year (07–17)	18-year (99–17)	LCL	UCL
Curlew	61	6	-10	-51 *	-68	-29
Common Sandpiper	69	-8	-19 *	-32 *	-43	-18
(Common Tern)	31	-17	-20	-19	-44	22
Kingfisher	72	-2	-15	-17	-38	14
Sand Martin	76	-1	24	19	-26	97
Sedge Warbler	91	-28	-42 *	-61 *	-72	-45
Reed Warbler	58	-19 *	0	-13	-31	10
Whitethroat	130	-24 *	-4	6	-10	26
Dipper	92	-8	5	-8	-27	17
Grey Wagtail	129	-16	-15 *	-11	-27	8
Pied Wagtail	155	-24 *	-10	-32 *	-48	-18
Reed Bunting	112	-16	-17 *	-15	-31	1

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

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 2018:

ENGLAND

Huntingdon & Peterborough
 Staffordshire (North, South, West)
 Worcestershire

Derek Langslow
 Scott Petrek
 Steve Davies

NORTHERN IRELAND

Antrim & Belfast
 Armagh
 Down
 Londonderry

Michael Stinson
 Michael Stinson
 Michael Stinson
 Michael Stinson

We currently have vacancies for Regional Organisers for WBBS in Angus, Ayrshire, Berkshire, Carmarthen, Essex (South), Kent, London (North), Merseyside, Nottinghamshire, Yorkshire (East) and Wigtown.

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, but we would especially like to thank the ROs for their efforts.

BBS Regional Organisers in 2018:

ENGLAND

Avon
Bedfordshire
Berkshire
Birmingham & West Midlands
Buckinghamshire
Cambridgeshire
Cheshire (Mid)
Cheshire (North-East and South)
Cleveland
Cornwall
Cumbria
Derbyshire (North, South)
Devon
Dorset
Durham
Essex (North-East)
Essex (North-West)
Essex (South)
Gloucestershire
Hampshire
Herefordshire
Hertfordshire
Huntingdon & Peterborough
Isle of Wight
Isles of Scilly
Kent
Lancashire (East)
Lancashire (North-West)
Lancashire (South)
Leicestershire & Rutland
Lincolnshire (East)
Lincolnshire (North)
Lincolnshire (South)
Lincolnshire (West)
London (North)
London (South)
Manchester
Merseyside
Norfolk (North-East)
Norfolk (North-West)
Norfolk (South-East)
Norfolk (South-West)
Northamptonshire
Northumberland
Nottinghamshire
Oxfordshire (North)
Oxfordshire (South)
Shropshire
Somerset
Staffordshire (North, South, West)
Suffolk
Surrey
Sussex
The Wirral
Warwickshire
Wiltshire (North, South)
Worcestershire
Yorkshire (Bradford)
Yorkshire (Central)
Yorkshire (East, Hull)
Yorkshire (Leeds & Wakefield)
Yorkshire (North-East)
Yorkshire (North-West)
Yorkshire (Richmond)
Yorkshire (South-East)
Yorkshire (South-West)
Yorkshire (York)

Dave Stoddard
Judith Knight
Sarah & Ken White (now **VACANT**)
Steve Davies
Phil Tizzard
Rob Pople
Paul Miller
Hugh Pulsford
Michael Leakey
Michael Williams
Colin Gay with
Stephen Westerberg & Dave Piercy
Dave Budworth
Stella Beavan
VACANT (now Jack Winsper)
David Sowerbutts
Rod Bleach
Graham Smith
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Glynne Evans
Chris Robinson
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Harry Green
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Mike Brown
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Graham Oliver
Bjorn Blanchard (now Alex Gould)
Mike Gibson
Aidan Gill
Grant Bigg
Rob Chapman

SCOTLAND

Aberdeen
Angus
Argyll (Mull, Coll, Tiree & Morven)
Argyll (mainland & Gigha) & Bute
Arran
Ayrshire
Benbecula & The Uists
Borders
Caithness
Central
Dumfries
Fife & Kinross
Inverness (East & Speyside, West)
Islay, Jura & Colonsay

Moray Souter
Peter Ellis (now **VACANT**)
Ewan Miles
Nigel Scriven
James Cassels
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Yvonne Benting
Dave McGarvie
Donald Ormand
Neil Bielby
Andy Riches
Norman Elkins
Hugh Insley
David Wood

Kincardine & Deeside
Kirkcubright
Lanark, Renfrew & Dunbarton
Lewis & Harris
Lothian
Moray & Nairn
Orkney
Perthshire
Rhum, Eigg, Canna & Muck
Ross-shire
Shetland
Skye
Sutherland
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Bob Swann
Simon Cohen
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Carol Hawley
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WALES

BTO Wales Officer
Anglesey
Brecknock
Caernarfon
Cardigan
Carmarthen
Clwyd (East)
Clwyd (West)
Glamorgan (Mid, South)
Glamorgan (West)
Gwent
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BTO Northern Ireland Officer
Antrim & Belfast
Armagh
Down
Fermanagh
Londonderry
Tyrone

Shane Wolsey
Kevin Mawhinney
Stephen Hewitt
Alastair McIlwain
Michael Stinson
John Clarke
Michael Stinson

CHANNEL ISLANDS

Channel Islands (excl. Jersey)
Jersey

Chris Mourant
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: Bjorn Blanchard, Peter Ellis, Bob Harris, Jerry Lewis, Lynda Milner, Rob Morton, Geoff Orton, Geoff Sheppard, Terry Wells, Stephen Westerberg and Sarah and Ken White.

We would like to thank and welcome Dave Anning, Gordon Brady, Richard Clarke, Alex Gould, Annette Jarratt-Knock and Jack Winsper who have taken over as ROs during the past year.

Finally, we would like to thank all the landowners who kindly allow volunteers to walk BBS and WBBS transects on their land.

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British Trust for Ornithology
The Nunnery
Thetford
Norfolk
IP24 2PU

01842 750050
bbs@bto.org
wbbs@bto.org
www.bto.org/bbs
www.bto.org/wbbs