The Breeding Bird Survey 2019 *incorporating the Waterways Breeding Bird Survey*

Population trends of the UK's breeding birds

BTO Looking out for birds

JNCC

rspb giving nature a home

THE 2019 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 2019 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

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

THE BBS TEAM AT 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, produced the bird population and mammal trends for 2019. 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 and WBBS research programmes, 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**

Tweet us @BBS_birds

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Report production was by Sarah Harris and we are very grateful to John Marchant for proofreading the report.

The cover photo of a Greenfinch was kindly supplied by Ben Hall/rspb-images.com and the report was printed by Swallowtail Print, Norwich, using paper from responsible sources.

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INSIDE...

This is the twenty-fifth annual report of the BTO/JNCC/RSPB Breeding Bird Survey (BBS), documenting the population trends of widespread UK breeding bird species during the period 1994–2019.

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 more than 115 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.

Sedge Warbler has declined along our waterways by 63% between 1999 and 2018. See more WBBS trends on pages 34 and 35.

SEDGE WARBLER: BETHAN CLYNE

CITATION

Harris, S.J., Massimino, D., Balmer, D.E., Eaton, M.A., Noble, D.G., Pearce-Higgins, J.W., Woodcock, P. & Gillings, S. 2020. *The Breeding Bird Survey 2019.* BTO Research Report 726. British Trust for Ornithology, Thetford.

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The latest news from the Breeding Bird Survey

BBS volunteers excelled at butterfly recording, Upland Rovers surpassed 100 squares, Detection Type and Mammal data were received from a record percentage of squares, and a paper was published using BBS data to calculate the latest population estimates.

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

It has been a year of great achievements for the Breeding Bird Survey: 4,005 squares were surveyed thanks to the efforts of 2,766 volunteers across the UK and the Wider Countryside Butterfly Survey (WCBS) received special attention, resulting in an increase in coverage after a worrying succession of years with declining participation.

PUBLISHED PAPERS

The data collected during the surveys have been put to good use. As well as the annual population trends presented within this report, a recent paper used BBS and WBBS data to calculate new population estimates for birds in the UK – see pages 8 and 9. Further to this, page 27 provides a flavour of the breadth of scientific papers and reports that BBS data feed into.

LOOKING FORWARD

With the new BBS Online system bedding down, and a new Verification System used to check data as they arrive, we should highlight some of the new options in the system. The 'Details and Settings' in BBS Online allow users to set preferences for what paperwork they are sent, to indicate interest in taking part in WCBS, and to change how the online data-entry forms are displayed.

The verification system has alerted data checkers to a couple of minor but important more frequent data-recording errors: although it can be difficult at times, it is important that only adult birds are counted during the BBS and not fledglings, and that the same individuals are not counted on more than one sector.

WIDER COUNTRYSIDE BUTTERFLY SURVEY

There was a fantastic 21% increase in the number of BBS squares being surveyed for the WCBS in 2019 compared to 2018. This was excellent news after a decline in recent years, see Figure 1. Three-hundred and twenty squares were surveyed for the WCBS by BBS volunteers, with a further 512 surveys being conducted by Butterfly Conservation (BC) volunteers on BC squares.

The increase seen in 2019 on BBS squares was not mirrored in BC squares, where coverage remained stable. This does suggest that the increase seen on BBS squares was down to an increase in volunteer enthusiasm, possibly spurred on by BBS Online WCBS functionalities, rather than factors such as warm weather improving survey opportunities.

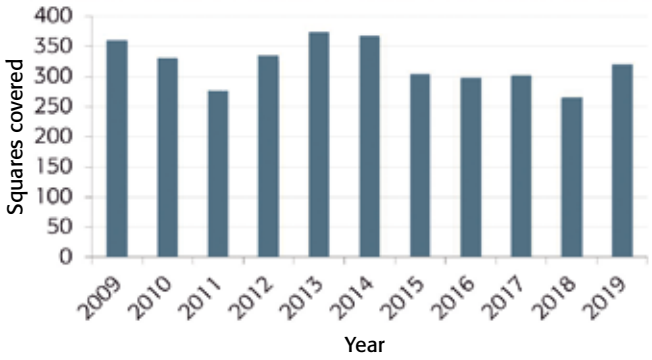


Figure 1 The number of BBS squares surveyed for the WCBS since 2009, showing an upturn in 2019.

Thank you to all who revisited their squares to monitor butterflies, with the option of also recording day-flying moths and Odonata. With 436 BBS squares currently registered for WCBS (including 32 BBS squares to be surveyed by BC volunteers) we hope this growth continues.

BBS ONLINE UPDATE

The 2019 survey season saw the 'new look' BBS Online system go live. The increased functionality included the ability to set system preferences, enter recce visit data, and for volunteers to see which of their BBS squares are registered for the Wider Countryside Butterfly Survey.

Towards the end of 2019, the **new download functions** were introduced for volunteers and Regional Organisers (ROs), allowing easier extracts of data, *e.g.* for landowners or, in the case of ROs, feedback to volunteers. BBS Online guidance and video tutorials are available at www.bto.org/bbs-online. As ever, paper returns – and any unentered historical data – are very welcome.

Upland Rovers

Introduced in 2017 in order to increase coverage in under-recorded, remote areas of the UK, Upland Rovers has gone from strength to strength. A very small selection of BBS squares are selected from the 'core' square-set each year and advertised as 'Upland Rovers' squares.

This means they are available for one-off visits in order to boost coverage on these rarely, if ever, covered squares.

Here's what four of the 2019 Upland Rovers had to say about their expeditions...

Holiday adventure

Sally Mousley
Sutherland

We roll out of bed early and go as far north as possible without crossing sea. Stop and check the weather forecast. Next morning, go and record the Upland Rovers square. Even though this is our second year, the sense of space is still dizzying, the landscape is huge, the distances long, the views breathtaking. My "home" BBS square is in the urban Midlands where views are generally restricted to a few yards. Here you can see miles – literally. The birds are also very different; mostly Meadow Pipit and Skylark, with Cuckoo (now hard to find at all at home), Red Grouse, surprisingly no waders this year, and finally, among more familiar species, Grey Wagtail by the river. A great start to our holiday!

RSPB sabbatical

Jim Rowe
Ross-shire & Inverness

The challenge? To survey 11 particularly remote sites in the stunning landscapes of the north-west Highlands. All reached, though unexpected poor weather above the 700-m contour on Meall Mòr forced an abandonment! Four nights of wild camping and five cycle rides up glen tracks and wind farm roads. One transect route over a Munro summit I had not previously visited was a bonus. Ring Ouzel, Golden Plover and Curlew featured on the surveys, with approach-route sightings of the trip highlight – summer-plumage Black-throated Divers!

Fifteen squares in 12 days

Hugh Tooby
Shetland

At the start of 2019 only three of the 15 BBS squares in Shetland had ever received a visit. So, I headed north in May to try to rectify this. Unst and Yell yielded many Arctic Tern, a nesting Arctic Skua fighting off a Hooded Crow in a spectacular aerial dogfight and a visit to Hermaness with its Gannets, Puffins and Bonxies (Great Skua). Mainland Shetland highlights included Whimbrel and a pair of summer Whooper Swans. Esha Ness was the scenic high point with several Red-throated Divers in breeding plumage. Another square yielded 22 different species; and it was interesting to include Eider in an Upland Rovers survey (at remote Braga Ness). My last day brought fabulous views and Bonxies on the Clift Hills. A dash to the final square at Dales Voe and I had visited all 15 with only a few hours to spare before my return ferry.

Public transport & a cycle!

Louise Bacon
Argyll & Ross-shire

Early May. Light snow shower, 19-km bike-ride to start, 1.5-km walk through regenerating forest, glorious views over Loch Maree. Star bird: Greenshank on the lochans of Beinn Eighe. What a start to my expedition by public transport and cycle! Day two, a 2-km steep hike to featureless moorland, melancholic Golden Plover for company, compass necessary!

Late June, an easy life covering squares with a partner and car. Face-high bracken, ticks and clegs – the familiar friends of an Argyll visit. Gannet overhead, and Jura the view. Divers, sandpipers, Snipe. What treats!

SUTHERLAND SQUARE: H. JOHN MOUSLEY, GLEN ELCHAIG: JIM ROWE, VIEW FROM CLIFT HILLS: HUGH TOOBY, VIEW FROM BEINN EIGHE: LOUISE BACON

Sightings and coverage in 2019

Over the years many milestones have been reached, with coverage increasing at a UK and country scale, as well as within the additional survey initiatives introduced over the years. It has been possible to keep surpassing these goals only with the skill and devotion of BBS volunteers, 2,766 of whom contributed to the survey in 2019.

TWO VISITS, TWO CHANCES

With the success of the Upland Rovers scheme (whereby the most remote squares, upland in habitat type, have been carefully selected to be advertised as available for 'one-off' surveys), it remains important to emphasise the value of two visits to 'core' BBS squares. In 1994, 2% of squares were surveyed just once but in 2016 (pre-Upland Rovers) this percentage was 7%, in 2019 it was 6% – *excluding* the 125 Upland Rovers squares, of which 67 were visited once.

Two visits allow for two chances to gather the maximum counts per species for the square, from the noisy early-spring Dunnock to the later-arriving Spotted Flycatcher. These maximum counts, across two visits, are what feed into the population trends.

DETECTION TYPE

From 67% of squares recording Detection Type in 2014, when it was first introduced to BBS, to an impressive 81% of squares with detection information in 2019, this optional extra continues to grow. Pages 8–9 highlight the potential these data hold for improvements to population estimates and monitoring in general.

COLONY RECORDING

Since 1994, colony records have been submitted for 33 species, from Mute Swans at Abbotsbury Swannery to the more expected candidates for colony recording such as Little Egret and Sand Martin. All colony data are welcome; remember to count colonies in addition to counting the adult birds along transects as normal. In 2019, colony data were submitted from 458 squares.

1994 – 1,570

BBS STARTED

Over 1,500 squares were covered across the UK in the first year of the survey!

2003 – 109

NORTHERN IRELAND

Over 100 squares were covered across the country for the first time.

2005 – 2,181

ENGLAND

England achieved coverage of over 2,000 squares.

2012 – 21

CHANNEL ISLANDS

The Channel Islands saw coverage exceed 20 squares.

WALES

Wales passed the '300 squares' milestone.

2013 – 331 / 101

UPLAND ADJACENT

A scheme whereby an upland square can be 'paired' with an adjacent square resulted in over 100 Upland Adjacent squares being covered alongside their 'core' BBS square.

2018 – 4,039

UK

A staggering milestone reached, with over 4,000 squares covered across the UK.

UPLAND ROVERS

Started in 2017, the Upland Rovers scheme has grown, and in 2019, broke the '100 squares' barrier.

2019 – 125 / 605 / 8

SCOTLAND

Over 600 squares were covered in Scotland, aided by the Upland Rovers scheme.

ISLE OF MAN

2019 saw the Isle of Man double its coverage compared to 2018!

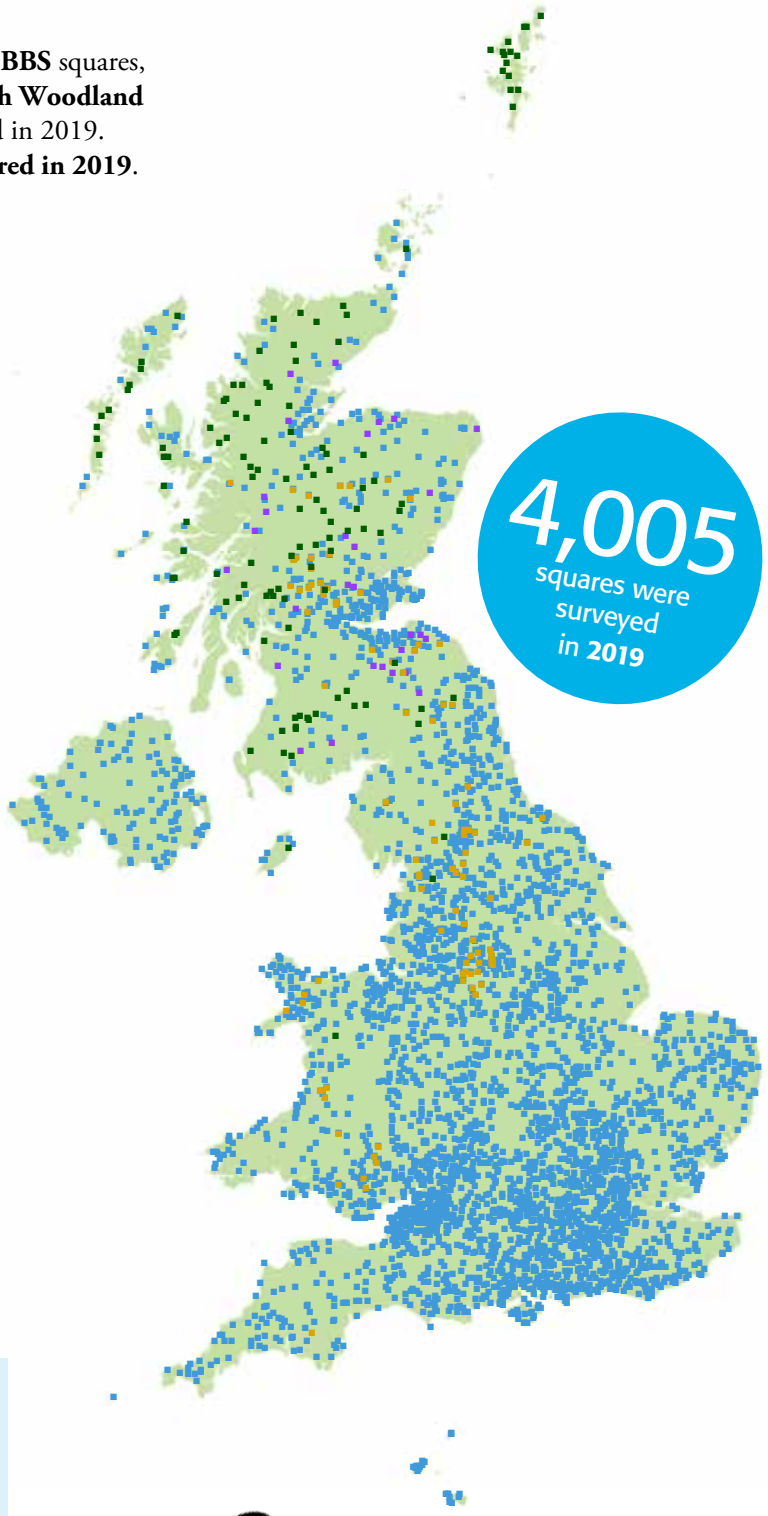
Table 1 The number of BBS squares with data received to date.

	1994	1995	1996	1997	1998	1999	2000	2001*	2002	2003
England	1,173	1,325	1,420	1,657	1,713	1,792	1,749	533	1,652	1,739
Scotland	245	283	308	313	309	275	246	78	231	255
Wales	122	121	116	138	192	223	213	22	215	214
Northern Ireland	25	17	65	75	85	95	83	0	97	109
Channel Islands	1	1	7	6	7	7	7	7	7	7
Isle of Man	4	4	4	6	6	5	3	0	3	4
UK total	**1,570**	**1,751**	**1,920**	**2,195**	**2,312**	**2,397**	**2,301**	**640**	**2,205**	**2,328**

COVERAGE OVERVIEW

This coverage map illustrates where the **3,756 'core' BBS** squares, **95 'add-on' Upland Adjacent** squares, **29 Scottish Woodland** squares and **125 Upland Rovers** squares were located in 2019. Combined, these make up the **4,005 BBS squares covered in 2019**.

Squares from the Upland BBS, covered between 2006 and 2013 by professional fieldworkers, are not shown on this map nor in Table 1, 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.



THE BIRDS!

Sightings in 2019...

Number of bird species recorded: 223.

Square with the most bird species: 72 near Ashton Keynes, south of Cirencester. A mix of gravels pits, scrub, human sites, grassland and semi-natural marsh.

Number of squares with fewer than five bird species recorded: 91, of which 36 were Upland Rovers squares.

Overall average species count: 30. For Upland Rovers specifically, the average was 11 species.

Most widespread bird species: Woodpigeon and Wren, both on 90% of all squares surveyed.

Rarest bird species: Golden Pheasant, Great Bustard, Stone-curlew and Water Pipit.

14,996 km

is the distance walked by volunteers in **2019** when actively surveying along transect routes!

This is the distance from **BTO HQ** in **Thetford, Norfolk,** to **Palmer Land** on the **Antarctic Peninsula!**

FOOTPRINTS: ICONS8.COM

299,701 km

is the total distance walked along transects by BBS volunteers since the survey began in 1994.

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1,886	2,181	2,573	2,822	2,556	2,570	2,570	2,539	2,671	2,731	2,735	2,832	2,875	2,948	2,989	2,928
274	305	336	487	406	397	331	359	383	473	482	476	490	522	581	605
254	271	272	269	242	235	247	224	274	331	339	341	333	338	328	324
102	120	108	131	121	116	115	110	117	127	120	78	127	131	119	119
11	13	19	16	15	17	16	15	21	26	27	23	24	28	18	21
6	3	5	4	1	0	0	0	4	0	0	3	2	3	4	8
2,533	**2,893**	**3,313**	**3,729**	**3,341**	**3,335**	**3,279**	**3,247**	**3,470**	**3,688**	**3,703**	**3,753**	**3,851**	**3,970**	**4,039**	**4,005**

**2001: foot-and-mouth disease*

APEP4: New population estimates

The latest Avian Population Estimates Panel (APEP) paper has been published. This is the fourth in a series dating back to 1997. APEP papers form a 'stocktake', gathered from a range of sources, to provide population estimates – this time for 251 bird species.

By **Ian Woodward**, Research Ecologist, BTO

BBS and WBBS have contributed towards the latest APEP paper, published in February 2020, updating the population estimates for birds in Great Britain and the United Kingdom. This paper estimates that there are around 85 million breeding pairs of birds in the UK, including around 11 million pairs of Wren!

EARLIER ESTIMATES AND TRENDS

Population sizes of birds are used to assess conservation status and vulnerability and to understand avian communities. Although a wide range of data sources were used for the 251 species for which breeding population estimates were calculated, 97 of these were updated from earlier estimates using BBS trends, and estimates for a further seven species were updated using trends from the WBBS (Table 2). The estimates from earlier APEP papers were updated using the percentage changes reported by BBS or WBBS (depending on the species) as a guide to increasing or decreasing the previous population estimates.

The individual winners and losers will be no surprise to those who are familiar with BBS and WBBS trends, although the changes measured by both schemes perhaps appear starker when translated into population estimates: the number of Turtle Doves in the UK was estimated at 75,000 pairs in 1997, but even the new estimate of 3,600 pairs in 2016 may already be too high, given the ongoing decline. Similarly, the updated estimate for Spotted Flycatcher is just 41,500 pairs in 2016, down from 130,000 pairs in 1988–91. In contrast, there were just 160 pairs of Red Kite in 1995 but, following the successful reintroduction scheme, the species is now sufficiently widespread to be monitored by BBS, and the latest estimate is 4,400 pairs.

DISTANCE BANDS

For 24 of these species, BBS surveyors have contributed even more directly to the new estimates, as the original population estimates were produced using BBS distance bands to estimate breeding densities (Newson *et al.* 2008) – see Table 3. The uncertainty around the relative detectability of males and females, and the number of non-breeding birds present, is the reason why population estimates have been calculated using BBS for only a subset of species. As a result, many of our current population estimates are still based on density estimates produced for the *Bird Atlas 1988–91*. Many of these were based on territory mapping from the predecessor to BBS, the Common Birds Census, and are likely to be reasonably robust for most species. However, recent changes to BBS offer a future opportunity to use more up-to-date data to check and refine density estimates, and hence population estimates, for many more species in addition to the 24 for which BBS data are already used to estimate density.

REFINING ESTIMATES

Volunteers are now able to record how birds were first detected (by song, call or sight). This is important, as it can help us to infer whether males, females or birds of different breeding status are detected in different ways and hence to refine population estimates accordingly. For example, if most or all individuals of a species are detected by song we can infer that both our count and distance-based population estimate relate to territorial males. BBS squares are selected randomly and can therefore be considered to be representative of the wider countryside – as they are for the production of the national trends. Although the analyses to produce population estimates using detection methods are not necessarily straightforward, we hope that there will be opportunities to do so in the future.

DETECTION TYPE

By making the assumption that most if not all individuals in the closest distance band (within 25 m of the observer) will be detected, and comparing the count in this closest band against the numbers counted in other distance bands, we can estimate what proportion of birds in the further distance bands remain undetected during a BBS. However, these density-based estimates work better for some species than others. In order to turn BBS data into population estimates, we need to know whether observers are recording mostly males that are on territory (singing birds) or both members of a pair, and whether the counts could include a significant number of non-breeding birds.

HOW CAN BBS OBSERVERS CONTRIBUTE TO FUTURE POPULATION ESTIMATES?

1. Continue to carry out BBS and encourage others to do so!
2. Start recording Detection Type if you do not already do so.
3. Take part in Upland Rovers if you go on holiday to remote areas of the UK, to increase coverage of upland squares and upland species.

Table 2 Population estimates of species updated using data from Waterways Bird Survey (WBS) and Waterways Breeding Bird Survey (WBBS) combined. All were updated to the year 2016.

Species	UK estimates 2016 (lower & upper estimates: 95% confidence limits)	Units
Goosander	**4,800** (4,250–5,250)	Pairs
Little Grebe	**3,650–7,300**	Pairs
Common Sandpiper	**13,000**	Pairs
Kingfisher	**3,850–6,400**	Pairs
Sand Martin	**70,500–225,000**	Nests
Dipper	**6,900–20,500**	Pairs
Grey Wagtail	**37,000**	Pairs

Table 3 Updated population estimates of species which are based on original estimates using BBS distance bands. All estimates were updated to the year 2016.

Species	UK estimates 2016 (lower & upper estimates: 95% confidence limits)	Units
Swift	**59,000** (43,000–75,000)	Pairs
Cuckoo	**18,000** (9,800–26,000)	Pairs
Feral Pigeon/Rock Dove	**465,000** (380,000–550,000)	Pairs
Woodpigeon	**5,150,000** (4,850,000–5,450,000)	Pairs
Collared Dove	**810,000** (730,000–890,000)	Pairs
Little Owl	**3,600** (2,350–4,900)	Pairs
Gt Spotted Woodpecker	**130,000** (120,000–145,000)	Pairs
Green Woodpecker	**45,500** (40,500–50,500)	Pairs
Jackdaw	**1,550,000** (1,350,000–1,750,000)	Pairs
House Martin	**480,000** (335,000–620,000)	Pairs
Reed Warbler	**130,000** (100,000–155,000)	Pairs
Starling	**1,750,000** (1,550,000–1,950,000)	Pairs
Blackbird	**5,050,000** (4,800,000–5,250,000)	Pairs
Redstart	**135,000** (97,000–170,000)	Pairs
Whinchat	**49,500** (19,500–79,000)	Pairs
Stonechat	**65,000** (43,000–87,000)	Pairs
Wheatear	**170,000** (120,000–220,000)	Pairs
House Sparrow	**5,300,000** (4,800,000–5,750,000)	Pairs
Pied Wagtail	**505,000** (445,000–570,000)	Pairs
Meadow Pipit	**2,450,000** (2,100,000–2,750,000)	Pairs
Tree Pipit	**105,000** (66,000–145,000)	Pairs
Greenfinch	**785,000** (735,000–835,000)	Pairs
Crossbill	**26,000** (19,500–34,000)	Pairs
Goldfinch	**1,650,000** (1,450,000–1,800,000)	Pairs

The updated estimate for Spotted Flycatcher is just 41,500 pairs in 2016, down from 130,000 in 1988–91.

SPOTTED FLYCATCHER: SCOTT MAYSON

FIND OUT MORE...

Woodward, I., Aebischer, N., Burnell, D., Eaton, M., Frost, T., Hall, C., Stroud, D. & Noble, D. 2020. Population estimates of birds in Great Britain and the United Kingdom. *British Birds* **113**: 69–104.

Musgrove, A., Aebischer, N., Eaton, M., Hearn, R., Newson, S.E., Noble, D., Parsons, M., Risely, K. & Stroud, D. 2013. Population estimates of birds in Great Britain and the United Kingdom. *British Birds* **106**: 64–100.

Newson, S.E., Evans, K.L., Noble, D.G., Greenwood, J.J.D. & Gaston, K.J. 2008. Use of distance sampling to improve estimates of national population sizes for common and widespread breeding birds in the UK. *Journal of Applied Ecology* **45**: 1330–1338.

Behind the scenes: Running trends

From count data to population trends: how the transformation happens.

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

Every year, more than one million birds are counted by our amazing BBS volunteers. Here, I explain how we transform all of those count data into population trends for those species for which we have sufficient data.

MILLONS OF ROWS OF DATA

When I receive the data from Justin Walker, the BTO Database Developer, at the beginning of January, a lot of work has already been done behind the scenes. The BBS National Organiser, Sarah Harris, has already gone through all the data and checked for obvious errors. However, to the human eye the data still don't say much. Millions of rows of numbers and letters have yet to be transformed into one of the most important products of the survey: species' population trends.

The first step consists of filtering out some of the data that we don't use for these core trends: we do not routinely report population trends for gulls because a large proportion of the records are of non-breeding individuals, nor do we report trends for rare breeding species with substantial wintering populations, such as Fieldfare. For six wader species we filter out counts of non-breeding flocks in any single 200-m transect section. For the same reason, we also exclude all counts of some species made outside their breeding range. All bird counts remain useful for research *etc,* so everything still needs counting!

ADDING UP

After filtering the data, we sum up all counts, for each species, across all 200-m transect sections and all four (including 'flight') distance categories. While distance categories are fundamental when one needs to estimate absolute population densities, *i.e.* how many individual birds are present in a unit of area, we don't currently use distance information for estimating population trends, as with population trends we only measure change, not absolute numbers (see pages 8–9 about analyses for which distance information is key).

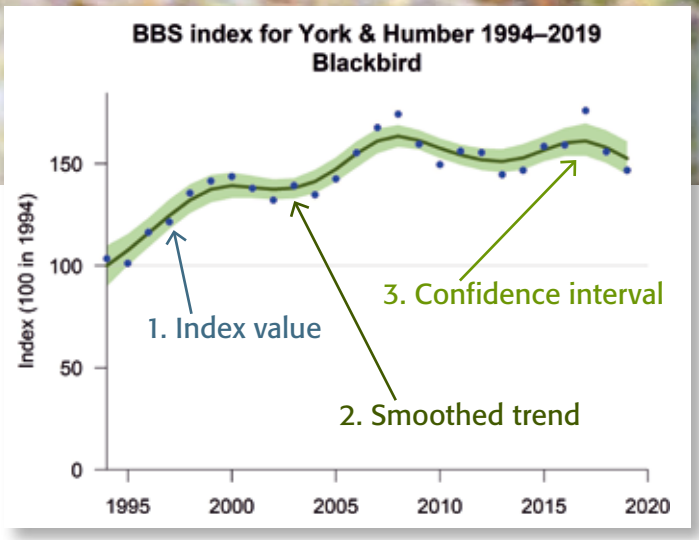
The last step in the data-preparation process is to calculate the maximum count of each species in each square between the Early and Late visit. This maximum count is the number that enters the next crucial step: the statistical analysis.

STATISTICS

By this stage we now have a single number that expresses the abundance of each species in a given square in a given year. If all squares were surveyed every year we could just add up the counts each year to derive the trend. But because not all squares are surveyed every year we need to use a statistical model which can account for the gaps (as long as there aren't too many!) and produce a trend estimate. Another important thing that the model does is to 'weight' the counts differently depending on which part of the country the data come from. This is necessary because we have fewer squares surveyed in some regions, so in order to represent those areas properly, their influence on the trends needs to be upweighted, to give them a greater say in what the overall UK trend is. After processing the data, the model produces, for each species and each year, a number that represents the relative population level of the species in the given year. We call this number the 'population index'. If the population index is, say, 10% less for 2019 than 2018 for Greenfinch, then we assume that Greenfinch population has decreased by 10% between these two years.

The population index produced by our statistical model is vital for estimating year-to-year population changes, as described above. However, we are often interested in calculating long-term trends as these are very useful to assess species' conservation status. To estimate long-term trends we still use the population index but we make it

Trends for multiple species are calculated at the same time but, for abundant species such as Blackbird, this process can take up to two weeks!



smoother, so that we can ignore the occasional peaks and troughs that occur during some 'odd' years and we can more easily see the bigger picture. We usually calculate long-term population trends between the penultimate and the second year of available data (for example between 1995 and 2018 in this report). We leave out the two outermost years because, at the two ends of the series, the smoothed population index is very sensitive to fluctuations of the unsmoothed population index.

MEASURING UNCERTAINTY

Most of the job is done now: we have the unsmoothed population index which represents the year-to-year fluctuations of the population of our species, we have the smoothed population index which shows the long-term trend, and we calculate all the measures of change between, say, last year and the year before, or between the penultimate and the second year of the data series. What we still need to understand is how confident we are about the results. Our population indices are an estimate of what happens in the real world and some estimates will be more robust than others. For very common species with loads of data it is not difficult to obtain very reliable estimates, but for less common species the uncertainty around the numbers may be higher. For this reason we need to calculate what statisticians call 'confidence intervals'. These are a range of values around our estimates within which we think it is likely the true value falls. To calculate the confidence intervals we use a particular statistical technique called 'bootstrapping'.

Essentially, we create random sets of BBS squares from all the surveyed squares. As in a lottery, we extract squares randomly, but unlike a lottery, the same squares can be extracted more than once. We repeat the trend production procedure described by using this set of randomly drawn squares. By repeating this process hundreds of times we obtain different values for our population indices. If these values are all very similar to each other, then we are very confident about our estimates, otherwise if these values are quite different from each other, then the confidence intervals are wider and the uncertainty around our estimates is higher.

WORTH THE WAIT

In recent years, the analysis has taken around six weeks; from receiving the raw data to having the trends produced with confidence intervals. However, this process is set to speed up with new technology used for the first time this year and showing very promising advances in timing!

Once all of this is done for all bird and mammal species, for BBS and WBBS data, and for all countries and regions for which we show population trends, I can finally pass all the results back to Sarah, who writes the report you are reading now!

BLACKBIRD: SARAH KELMAN/BTO

Disease in bird populations

How is disease impacting UK bird populations?

By **Rob Robinson**, Associate Director – Research, BTO

The world is a dangerous place for an individual bird, which may succumb to one of many threats, some natural, some man-made. Among these, birds suffer from a plethora of parasites and disease-inducing organisms, of which some cause little harm, others are deadly. We are becoming increasingly aware of the importance of disease for some bird populations – thanks, in large part, to data gathered by BBS surveyors.

CYCLING GROUSE

Sitting watching birds in our garden we almost never see the pathogens that cause the disease themselves, only the symptoms that result: a fluffed-up House Sparrow; a Chaffinch with a swollen, scaly leg; or a Dunnock with an unsightly growth. Some detective work is needed, then, as many of these symptoms may be caused by different organisms. Probably the best-studied disease in UK birds is louping ill in Red Grouse. Grouse are susceptible to infection by a parasitic worm *Trichostrongylus tenuis* which, through complicated interactions with their behaviour, contributes to cyclic increases and decreases in grouse numbers, both on individual moors and nationally.

Often, a pathogen circulates, causing illness in individuals but having no real impact on a species' overall population. Avian influenza often falls into this category, for example; several different strains are commonly recorded in wildfowl and waders, but usually they go unnoticed. Similarly, *Salmonella* is commonly reported in finches and sparrows, especially in the winter, but has little overall impact on the population and, interestingly, has been recorded less frequently recently. The spread of *Salmonella* and other diseases is greater when birds come into close contact with each other, making it important to keep bird feeders clean, rotate their position and feed in moderation, for sometimes diseases can have much more dramatic effects on our bird populations.

A NEW DISEASE

In 2007, BBS monitoring picked up signs of the calamitous effect the *Trichomonas gallinae* parasite would have on Greenfinches, a couple of years after the first records of the disease it causes (trichomonosis). Since then the population has continued to decline at a rapid rate, with no sign of slowing more than 10 years later, which is unexpected. The disease affects the upper digestive system, and means individuals have difficulty eating; it is well known in doves (where it is called 'canker') and birds of prey ('frounce'). The origin of the disease is unclear, although it may have 'jumped' from pigeons or doves. Worryingly, the BBS trend for Chaffinch is now starting to show a similar pattern, as is that for Sparrowhawk. Can the recent decline in BBS numbers for the latter be attributed to eating infected finches? Scientists at BTO, in collaboration with the Garden Wildlife Health project, will be looking at how the BBS and our other data sets can answer these questions, even as we watch the BBS results come in for signs of an upturn in numbers.

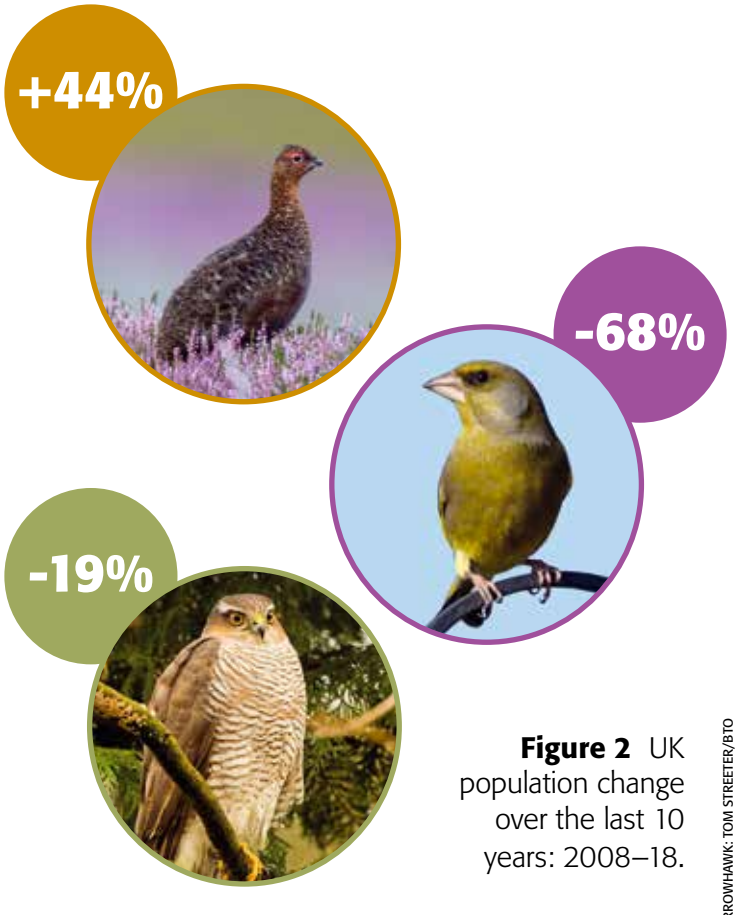


Figure 2 UK population change over the last 10 years: 2008–18.

RED GROUSE: ALEX MEEK/BTO, GREENFINCH: CARL BOVIS, SPARROWHAWK: TOM STREETER/BTO

FIND OUT MORE...

Martínez-Padilla, J., Redpath, S.M., Zeineddine, M. & Mougeot, F. 2014. Insights into population ecology from long-term studies of Red Grouse *Lagopus lagopus scoticus*. *Journal of Animal Ecology* **83**: 85–98.

Lawson, B., Robinson, R.A., Toms, M.P., Risely, K., MacDonald, S. & Cunningham, A.A. 2018. Health hazards to wild birds and risk factors associated with anthropogenic food provisioning. *Philosophical Transactions of the Royal Society B* **373**: 20170091.

Interpreting BBS and WBBS results

The pages which follow (pages 14–25 and pages 28–29) 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 change for 2018–19 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' (23-year) trend, a one-year change is presented.

BBS 'ADD-ON' SQUARES

'Add-on' squares surveyed during 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...

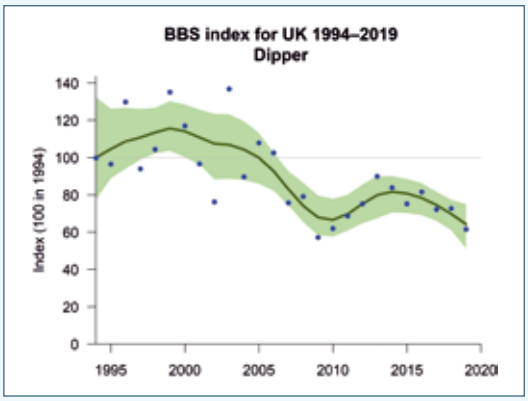
BBS bird trend graphs online: www.bto.org/bbs-graphs
BBS bird trend tables online: www.bto.org/bbs-tables
BBS mammal trends online: www.bto.org/bbs-mammals
WBBS results online:
www.bto.org/volunteer-surveys/wbbs/results

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

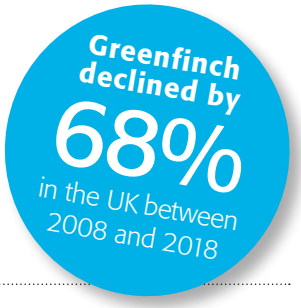


TRENDS AND TABLES EXPLAINED

Species	Min. sample	1-year (18–19)	10-year (08–18)	23-year (95–18)	LCL | UCL
Wheatear	366	**0**	**-35 ***	**-38 ***	-48 | -26
Dipper	66	**-15**	**-6**	**-33 ***	-52 | -5

- Trends for species in brackets are reported with caveats (explanation on 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' refers to 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 23-year trends, per species, per region.
- Trends are presented as the percentage change over three periods: one-year, 10-year and 23-year.
- The short-term change covers the most recent year of the survey, *i.e.* for BBS and WBBS: 2018 to 2019.
- The long-term changes for both BBS and WBBS, cover the lifetime of the survey (BBS birds: 1994–2019, BBS mammals 1995–2019, WBBS: 1998–2019). The 10-year trends cover 2007–19 for both surveys. All-time (23-year) and 10-year 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: 1995–2018, BBS mammal trend: 1996–2018 and 1999–2018 for WBBS.

United Kingdom – population trends



Here we display the trends produced for the 117 bird species which reach the reporting threshold of being recorded on 40 or more BBS squares, on average, during the time period the trend covers, *e.g.* all-time (23-year) or 10-year (five-year trends are published online at www.bto.org/bbs-tables). In addition, the one-year changes are displayed for 2018 to 2019. For more information on these trend tables, please see page 13.

STATISTICALLY SIGNIFICANT RESULTS

Period	No. species	Greatest change in UK trends	
Long-term (95–18) increases	38	(Little Egret):	2,399%
Long-term (95–18) declines	40	Turtle Dove:	-95%
Short-term (18–19) increases	22	Stonechat:	74%
Short-term (18–19) declines	14	(Barn Owl):	-44%

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

Statistically significant **increases**; 1995–2018 (38 species):

Statistically significant **declines**; 1995–2018 (40 species):

Statistically significant **increases**; 2008–18 (25 species):

Statistically significant **declines**; 2008–18 (39 species):

Figure 3 Number of species within each Birds of Conservation Concern 4 (BoCC4) category: Red, Amber or Green, which have undergone a statistically significant increase or decline over the long- (1995–2018) and medium-term (2008–18). Black = unclassified by BoCC4, *i.e.* non-native species. (BoCC4 paper reference on page 27).

UK TRENDS

Of the 117 trends, five species (**Indian Peafowl**, **Egyptian Goose**, **Teal**, **Marsh Harrier** and **Ring Ouzel**) are reportable for 10- and five-year trends, but not the 23-year trend, having reached the reporting threshold only in more recent years.

For four species, UK trends are reported because they reach the 30-square threshold in England for certain time periods. **Mandarin Duck** and **Cetti's Wabler** reach the UK threshold (40 squares) for 10- and five-year trends and the English threshold (30 squares) for the 23-year trend. **Willow Tit** reaches the UK reporting threshold for the 23-year trend, but the English threshold for the 10-year period; therefore both trends are shown in the UK table. **Nightingale** reaches the reporting thresholds for all the time periods for England, so all are shown for the UK.

Turtle Dove cannot be reported for five-year trends as it no longer reaches the reporting threshold. In 2019, **Turtle Dove** was recorded on just 20 BBS squares across the UK. **Pied Flycatcher** sits on the edge of the reporting thresholds for all the time periods, with 43 squares occupied in 2019, and trends can be reported for the 23-year and five-year time periods, but not the 10-year period. Of course, the 2019 square totals are just a snapshot and the thresholds are an average of squares occupied over time.

2019 RESULTS

Of the 78 statistically significant long-term results (those with an asterisk next to the trend figure), BoCC Red-listed species dominate the declines shown in Figure 3. Looking at the figures over the last 10 years, 64 trends are statistically significant and it is the Green-listed species which dominate the 10-year 'declines' bar. It is hard to interpret changes between the long- and medium-term bars because of the differences in species involved.

One species undergoing large declines across the UK is the **Greenfinch**, with a decline of 64% since 1994. Worryingly, **Chaffinch** also show declines, greatest in recent years – with a decline of 18% since 1994 and by 27% over the last 10 years. Both species, along with **Turtle Dove** (-95% between 1995 and 2018) and, more recently, **Collared Dove** (-22% between 2008 and 2018), have been recorded as having the trichomonosis disease in the population. For some species, this disease looks to be a key reason for decline, for others, it could exacerbate other factors causing population declines. See page 12 for more details.

Table 4 UK population trends during 2018–19, 2008–18 and 1995–2018.

Species	Min. sample	1-year (18–19)	10-year (08–18)	23-year (95–18)	LCL	UCL
Red Grouse	154	-18 *	44 *	23 *	4	52
Red-legged Partridge	603	16 *	-7	16 *	4	32
Grey Partridge	208	4	-34 *	-64 *	-70	-57
Pheasant	2,023	-1	1	35 *	27	46
Indian Peafowl	45	13	-37			
Canada Goose	551	19	-9	81 *	54	132
Greylag Goose	279	-1	14	169 *	28	466
Mute Swan	274	4	21	41 *	8	92
Egyptian Goose	51	-8	60 *			
Shelduck	156	2	-40	-7	-47	35
Mandarin Duck	36	25	63 *	457 *	220	1,344
Gadwall	48	12	129 *	253 *	84	547
Mallard	1,428	5	-7 *	10	-1	21
Teal	46	60	55 *			
Tufted Duck	166	-6	-2	33	-6	102
Goosander	45	3	12	-25	-56	50
Swift	1,052	16 *	-41 *	-58 *	-63	-52
Cuckoo	667	-2	13 *	-38 *	-44	-30
Feral Pigeon	730	0	-14 *	-24 *	-34	-12
Stock Dove	907	-6	39 *	29 *	15	46
Woodpigeon	2,745	-10 *	-2	34 *	27	41
Turtle Dove	56	-3	-82 *	-95 *	-97	-92
Collared Dove	1,453	-7 *	-22 *	-3	-9	5
Moorhen	670	13 *	-28 *	-18 *	-26	-10
Coot	287	9	-19 *	8	-12	34
Little Grebe	75	-11	20	37	-5	91
Great Crested Grebe	76	11	-15	1	-30	33
Oystercatcher	378	0	-11 *	-24 *	-34	-14
Lapwing	689	-4	-33 *	-43 *	-51	-36
Golden Plover	67	-10	4	-5	-32	27
Curlew	534	3	-13 *	-48 *	-55	-41
Snipe	178	-20 *	-9	26 *	4	55
Common Sandpiper	75	9	-9	-26 *	-42	-6
Redshank	88	14	-19	-42 *	-61	-7
(Common Tern)	69	9	80	53	-35	159
(Cormorant)	266	5	-3	24	-9	63
(Grey Heron)	693	-6	-18 *	-11	-23	3
(Little Egret)	59	10	64 *	2,399 *	737	>10,000
Sparrowhawk	356	1	-19 *	-22 *	-32	-9
Marsh Harrier	45	22	36 *			
Red Kite	195	-3	217 *	1,738 *	1,025	3,913
Buzzard	1,214	0	18 *	98 *	83	119
(Barn Owl)	52	-44 *	-31 *	251 *	150	440
(Tawny Owl)	97	1	-8	-30 *	-43	-14
Little Owl	81	-34 *	-46 *	-62 *	-71	-53
Kingfisher	57	51 *	-8	-12	-44	33
Gt Spotted Woodpecker	1,223	-6	-1	131 *	116	151
Green Woodpecker	876	-10 *	-21 *	15 *	4	28
Kestrel	686	-24 *	-26 *	-35 *	-42	-27
Hobby	46	-7	-23 *	-16	-39	17
Peregrine	54	11	-19	-39 *	-59	-11
Ring-necked Parakeet	92	-13	114 *	1,776 *	721	>10,000
Jay	864	-2	7 *	20 *	10	29
Magpie	2,075	3	0	-4	-8	1
Jackdaw	1,956	12 *	20 *	61 *	48	78
Rook	1,416	7	-13 *	-22 *	-30	-13
Carrion Crow	2,612	-3	1	17 *	9	27
Hooded Crow	145	36 *	6	5	-20	38
Raven	373	0	21	46 *	3	118

Species	Min. sample	1-year (18–19)	10-year (08–18)	23-year (95–18)	LCL	UCL
Coal Tit	924	7	-5	8	-5	21
Marsh Tit	151	4	-24 *	-41 *	-50	-29
Willow Tit	34	66	-33 *	-82 *	-87	-73
Blue Tit	2,544	2	-4 *	1	-2	5
Great Tit	2,429	4 *	-7 *	36 *	31	42
Skylark	1,868	0	-7	-17 *	-23	-12
Sand Martin	146	9	7	28	-33	148
Swallow	2,144	-10 *	-31 *	-6	-12	1
House Martin	983	7	-21 *	-20 *	-28	-13
Cetti's Warbler	34	22	101 *	417 *	103	3,417
Long-tailed Tit	1,079	36 *	0	20 *	10	33
Wood Warbler	49	-33	-22	-66 *	-80	-52
Willow Warbler	1,453	20 *	-3	-11 *	-18	-4
Chiffchaff	1,771	8 *	39 *	109 *	96	124
Sedge Warbler	314	5	-24 *	-15	-31	6
Reed Warbler	142	15 *	-4	21	-6	52
Grasshopper Warbler	87	0	-27 *	-12	-41	23
Blackcap	1,855	22 *	69 *	175 *	157	196
Garden Warbler	467	14	-12 *	-24 *	-35	-11
Lesser Whitethroat	303	34 *	11	8	-6	26
Whitethroat	1,503	26 *	1	21 *	11	32
Goldcrest	885	25 *	-8	7	-11	27
Wren	2,699	10 *	11 *	30 *	25	35
Nuthatch	595	1	35 *	110 *	90	136
Treecreeper	393	2	5	3	-10	19
Starling	1,821	6	-24 *	-53 *	-57	-48
Ring Ouzel	45	2	37			
Blackbird	2,720	-3 *	-2 *	23 *	18	28
Song Thrush	2,211	4	2	26 *	20	33
Mistle Thrush	1,208	-6	-15 *	-28 *	-35	-22
Spotted Flycatcher	172	15	-11	-51 *	-61	-39
Robin	2,614	0	0	22 *	17	26
Nightingale	33	17	-11	-56 *	-71	-24
Pied Flycatcher	40	18		-43 *	-71	-4
Redstart	192	17 *	8	6	-11	26
Whinchat	77	12	-14	-57 *	-71	-44
Stonechat	175	74 *	-16 *	118 *	70	191
Wheatear	366	0	-35 *	-38 *	-48	-26
Dipper	66	-15	-6	-33 *	-52	-5
House Sparrow	1,753	5 *	8 *	-1	-7	5
Tree Sparrow	204	0	31 *	117 *	57	191
Dunnock	2,275	-2	-4 *	17 *	10	24
Yellow Wagtail	168	30 *	24 *	-42 *	-53	-30
Grey Wagtail	234	8	-18 *	1	-15	18
Pied Wagtail	1,358	14 *	-10 *	-14 *	-20	-6
Meadow Pipit	865	1	8 *	-12 *	-19	-3
Tree Pipit	152	5	6	-7	-29	19
Chaffinch	2,719	-6 *	-27 *	-18 *	-22	-14
Bullfinch	696	10 *	21 *	10	-1	20
Greenfinch	1,799	-10 *	-68 *	-64 *	-66	-61
Linnet	1,297	-9 *	6	-21 *	-27	-16
Lesser Redpoll	182	-20 *	21	31	-2	80
Crossbill	62	-32	-28 *	-7	-40	50
Goldfinch	1,920	2	58 *	155 *	138	173
Siskin	213	-8	-8	27	-2	64
Corn Bunting	148	-7	7	-30 *	-44	-13
Yellowhammer	1,249	-1	-11 *	-24 *	-29	-18
Reed Bunting	553	4	5	36 *	23	58

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

England – population trends

Cetti's Warbler increased by 314% in England between 1995 and 2018

Trends for 113 species have been produced for England, with data from 2,928 squares. One species, Teal, currently reaches the reporting threshold for a five-year trend only; a 108% increase (published online). Table 5 displays the 112 species reaching the threshold for 23-year and 10-year trends.

STATISTICALLY SIGNIFICANT RESULTS

Period	No. species	Greatest change in English trends	
Long-term (95–18) increases	**36**	Red Kite:	**21,795%**
Long-term (95–18) declines	**40**	Turtle Dove:	**-95%**
Short-term (18–19) increases	**22**	Stonechat:	**87%**
Short-term (18–19) declines	**10**	(Barn Owl):	**-40%**

STONECHAT: SCOTT MAYSON

For six species, it is not currently possible to produce a long-term (23-year) trend but reporting thresholds were reached for 10- and five-year trends: the latter are published online.

For the first time, **Cetti's Warbler** reached the reporting threshold for a 23-year trend – an increase of 314% since 1994! This followed the species' range expansion from continental Europe, albeit with the occasional set-back owing to harsh winters.

BACK CHAT

Stonechat reached a milestone in England, with a 117% increase between 1995 and 2018. A move from the Amber list to the Green, indicating a 'secure' status by Birds of Conservation Concern 3, published in 2009, reflected an increasing trend throughout the lifetime of the BBS.

With a combination of fragmentation of suitable breeding habitat and severe winter weather preceding BBS, and a contraction in range revealed by *Breeding Atlases 1968–72* and *1988–91*, the increases since 1994 are thought to be a recovery from longer-term declines.

The most recent *Bird Atlas 2007–11* shows increases in the relative abundance in the south-west and north of the country. Milder winter weather is suggested to be benefiting **Stonechat**, and an altitudinal increase has also been detected.

FINCH FINDINGS

With a long-term (1995–2018) decline of 62%, the **Greenfinch** trend for England mirrors that of the UK. Furthermore, **Chaffinch** has declined by 24% in England, compared to 18% at the UK scale since 1994. As with **Greenfinch**, trichomonosis is documented in **Chaffinch** populations and, although not proven to be the main driver of change, the downturn does coincide with the outbreak of the disease in 2005. However, the main declines in **Chaffinch** were seen more recently (-28% in England, 2013–18, published online).

Chaffinch are adaptable – frequenting gardens and apparently coping better than some other finches with land-management changes over the past decade. A trend towards earlier nesting recorded in **Chaffinch** during the lifetime of the BBS has been attributed to climate change.

Goldfinch continues to increase in England, by 145% since 1994 and, as with **Chaffinch**, this species is nesting earlier. The increase in food availability at garden bird feeding stations, combined with recent research suggesting the decline in **Greenfinch** numbers could have reduced competition, has allowed **Goldfinch** even better access to food and positively influenced their trend.

FIND OUT MORE...

Plummer, K.E., Risely, K., Toms, M.P. & Siriwardena, G.M. 2019. The composition of British bird communities is associated with long-term garden bird feeding. *Nature Communications* **10**: 2088.

Table 5 Trends in England during 2018–19, 2008–18 and 1995–2018.

Species	Min. sample	1-year (18–19)	10-year (08–18)	23-year (95–18)	LCL	UCL
Red Grouse	88	-20 *	38 *	11	-21	62
Red-legged Partridge	582	20 *	-8 *	11	-2	28
Grey Partridge	186	-3	-36 *	-62 *	-68	-54
Pheasant	1,694	-1	1	36 *	27	48
Indian Peafowl	42	24	-9			
Canada Goose	504	22	-12	65 *	39	97
Greylag Goose	229	-4	43 *	306 *	140	666
Mute Swan	235	7	18	33	-1	86
Egyptian Goose	51	-8	60 *			
Shelduck	126	-1	-41	23	-27	55
Mandarin Duck	35	26	56 *	447 *	208	1,493
Gadwall	45	13	124 *	221 *	69	586
Mallard	1,191	4	-12 *	16 *	6	28
Tufted Duck	143	11	-11	13	-22	67
Swift	907	9	-40 *	-58 *	-63	-53
Cuckoo	467	-1	-27 *	-71 *	-74	-67
Feral Pigeon	592	9	-12 *	-29 *	-38	-18
Stock Dove	837	-2	41 *	26 *	11	45
Woodpigeon	2,187	-10 *	-4 *	37 *	28	45
Turtle Dove	55	-3	-81 *	-95 *	-96	-92
Collared Dove	1,259	-6 *	-27 *	-6	-13	4
Moorhen	619	11 *	-28 *	-20 *	-29	-11
Coot	259	12	-17 *	12	-9	40
Little Grebe	58	0	19	22	-20	96
Great Crested Grebe	69	11	-3	-11	-32	17
Oystercatcher	213	6	8	49 *	20	77
Lapwing	579	-4	-30 *	-30 *	-39	-20
Golden Plover	35	-15	0			
Curlew	348	-7	-5	-31 *	-41	-17
Snipe	95	0	34 *	27	-11	65
Common Sandpiper	32	35	1	-40 *	-59	-7
Redshank	63	24	-30 *	-43 *	-60	-22
(Common Tern)	64	-4	6	48	-19	206
(Cormorant)	222	12	-2	18	-4	50
(Grey Heron)	567	-7	-26 *	-23 *	-32	-10
(Little Egret)	54	0	56 *	2,129*	622	>10,000
Sparrowhawk	294	7	-28 *	-32 *	-39	-23
Marsh Harrier	39	25	37 *			
Red Kite	150	6	307 *	21,795*	>10,000	>10,000
Buzzard	852	8	34 *	226 *	174	278
(Barn Owl)	50	-40 *	-26 *	259 *	147	524
(Tawny Owl)	84	-5	2	-27 *	-45	-5
Little Owl	79	-33 *	-50 *	-61 *	-70	-50
Kingfisher	51	40	-24 *	-16	-40	23
Gt Spotted Woodpecker	1,058	-5	-8 *	104 *	86	123
Green Woodpecker	821	-10 *	-21 *	23 *	16	34
Kestrel	607	-19 *	-19 *	-21 *	-28	-12
Hobby	44	12	-24 *	-27	-54	12
Peregrine	33	13	-14	40	-4	194
Ring-necked Parakeet	92	-12	114 *	1,777 *	715	>10,000
Jay	742	-2	-1	3	-4	12
Magpie	1,732	4	1	-2	-7	3
Jackdaw	1,575	10 *	28 *	79 *	63	95
Rook	1,133	5	-10 *	-14 *	-24	-4
Carrion Crow	2,141	0	3	29 *	18	41
Raven	181	-11	49 *	41	-23	354

Species	Min. sample	1-year (18–19)	10-year (08–18)	23-year (95–18)	LCL	UCL
Coal Tit	621	5	10 *	32 *	14	54
Marsh Tit	138	16	-14 *	-37 *	-47	-25
Willow Tit	30	44	-54 *	-82 *	-88	-73
Blue Tit	2,060	3	-2	0	-3	5
Great Tit	1,962	6 *	-5 *	36 *	29	44
Skylark	1,486	5 *	-6 *	-24 *	-29	-20
Sand Martin	89	49 *	3	-1	-33	55
Swallow	1,644	-7	-33 *	-11	-12	1
House Martin	755	15 *	-28 *	-40 *	-51	-29
Cetti's Warbler	32	32 *	113 *	314 *	92	3,745
Long-tailed Tit	954	36 *	0	16 *	4	27
Willow Warbler	949	20 *	-18 *	-45 *	-52	-38
Chiffchaff	1,481	10 *	34 *	107 *	96	121
Sedge Warbler	198	23 *	-21 *	-26 *	-39	-8
Reed Warbler	134	16 *	-1	20	-4	58
Grasshopper Warbler	40	13	-30	-44 *	-64	-15
Blackcap	1,568	22 *	62 *	146 *	130	163
Garden Warbler	379	16	-9	-27 *	-37	-17
Lesser Whitethroat	290	33 *	16 *	11	-4	30
Whitethroat	1,288	27 *	0	15 *	7	25
Goldcrest	638	29 *	9	32 *	15	60
Wren	2,105	8 *	14 *	23 *	17	29
Nuthatch	509	6	37 *	126 *	96	160
Treecreeper	294	8	21 *	8	-9	26
Starling	1,477	7	-29 *	-61 *	-64	-57
Ring Ouzel	30	7	-13			
Blackbird	2,162	-2	-3 *	21 *	16	27
Song Thrush	1,725	-1	-1	22 *	15	32
Mistle Thrush	946	1	-22 *	-41 *	-45	-36
Spotted Flycatcher	113	-15	-36 *	-71 *	-78	-63
Robin	2,063	0	2	27 *	22	32
Nightingale	33	17	-11	-55 *	-73	-26
Redstart	106	17	16	-2	-21	21
Whinchat	32	11	0	-47 *	-69	-28
Stonechat	74	87 *	2	117 *	55	239
Wheatear	202	-3	-33 *	-31 *	-51	-2
Dipper	31	-22	-15	-48	-73	4
House Sparrow	1,421	8 *	6 *	-12 *	-18	-5
Tree Sparrow	157	3	14	58 *	22	111
Dunnock	1,851	-3	-2	13 *	7	18
Yellow Wagtail	164	30 *	26 *	-41 *	-51	-30
Grey Wagtail	158	9	-13 *	2	-17	33
Pied Wagtail	1,021	23 *	-9 *	-12 *	-18	-1
Meadow Pipit	454	5	-2	-21 *	-31	-11
Tree Pipit	74	20	-27	-56 *	-73	-31
Chaffinch	2,114	-6 *	-33 *	-24 *	-27	-20
Bullfinch	538	2	19 *	6	-5	18
Greenfinch	1,523	-11 *	-66 *	-62 *	-64	-58
Linnet	1,050	-14 *	19 *	-23 *	-29	-15
Lesser Redpoll	68	11	7	-25	-58	32
Crossbill	34	-40	-1			
Goldfinch	1,580	1	67 *	145 *	123	165
Siskin	81	-14	16	56	-20	220
Corn Bunting	141	-3	-1	-31 *	-45	-13
Yellowhammer	1,084	-5	-15 *	-34 *	-40	-29
Reed Bunting	417	10	8	36 *	19	57

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

Goldfinch increased by 224% in Scotland between 1995 and 2018

As in the other UK countries, Scotland trends are produced where a species reaches the 30-square threshold (see page 13). The result is that trends are reported for 69 species. Stock Dove, Jay, Garden Warbler and Crossbill have reached the thresholds for 10- and five-year periods and Spotted Flycatcher for the five-year period (published online), alongside the standard one-year (2018–19) change.

STATISTICALLY SIGNIFICANT RESULTS

Period	No. species	Greatest change in Scottish trends	
Long-term (95–18) increases	**26**	Chiffchaff:	**836%**
Long-term (95–18) declines	**12**	Greenfinch:	**-67%**
Short-term (18–19) increases	**4**	Stonechat:	**84%**
Short-term (18–19) declines	**5**	Kestrel:	**-59%**

SCOTTISH GREENFINCH

In Scotland, the theme of **Greenfinch** decline continues, with a 67% decline between 1995 and 2018. Again, trichomonosis is strongly linked to these declines.

SPARROWS

But it is not all bad news: **House Sparrow** and **Tree Sparrow** have increased in Scotland by 51% and 426%, respectively, between 1995 and 2018. Whilst **House Sparrow** appears relatively stable across the UK as a whole, **Tree Sparrow** has increased UK-wide by 117% between 1995 and 2018.

The Common Birds Census data (the predecessor to the BBS) combined with the BBS data allow trend calculation since the mid 1960s for both sparrow species. These trends show large declines between the 1970s and 1990s for **House** and **Tree Sparrow**: a time of rapid change in farmland management and a reduction in winter stubbles with weedy brassica, detrimental to seed-eaters.

Although these historical declines dwarf the increases during the lifetime of the BBS, in Scotland the highest densities of **Tree Sparrows** were found in stubble fields undersown with grass and weedy brassica fodder; such areas remain relatively seed-rich in Scotland (Fuller 2000, Hancock & Wilson 2003).

THE GOLDEN YEARS

Another seed-eater which has seen big changes in population in Scotland is **Goldfinch**, increasing by 224% long term (1995–2018). Across the UK as a whole, Goldfinch has increased by 155% during the same time period and the latest APEP4 paper estimates 1,650,000 breeding pairs in the UK in 2016 (see pages 8–9).

Increases in the **Goldfinch** population can be seen reflected across the UK, and garden feeding stations are thought to have aided this positive trend, providing a reliable food source year-round. *Bird Atlas 2007–11* illustrated the distribution change of **Goldfinch** between 1988–91 and 2007–11. Figure 4 shows gains in north-west Scotland – concentrated around the upland fringe. This expansion is coupled with increases in relative abundance throughout the rest of the UK during the same period.

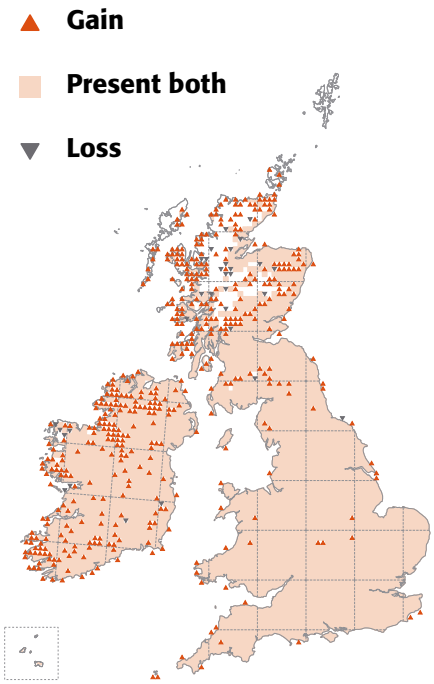


Figure 4 Goldfinch breeding distribution change from 1988–91 to 2007–11, as illustrated in the *Bird Atlas 2007–11.*

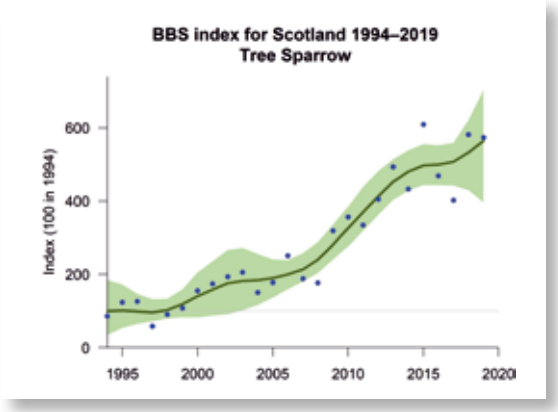
FIND OUT MORE...

Hancock, M.H. & Wilson, J.D. 2003. Winter habitat associations of seed-eating passerines on Scottish farmland. *Bird Study* **50**: 116–130.

Fuller, R. 2000. Relationships between recent changes in lowland British agriculture and farmland bird populations: an overview. In *Ecology and Conservation of Lowland Farmland Birds* (eds Aebischer, N.J., Evans, A.D., Grice, P.V. & Vickery, J.A.), 5–16. British Ornithologists' Union, Tring.

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

TREE SPARROW: LIZ CUTTING/BTO



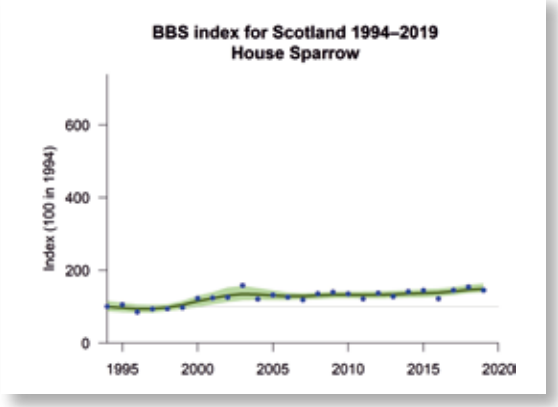


Table 6 Trends in Scotland during 2018–19, 2008–18 and 1995–2018.

Species	Min. sample	1-year (18–19)	10-year (08–18)	23-year (95–18)	LCL	UCL
Red Grouse	60	**-16**	**42** *	**28**	-2	58
Pheasant	164	**4**	**0**	**19**	0	52
Greylag Goose	36	**4**	**-9**	**86**	-50	581
Mallard	120	**-1**	**6**	**-13**	-27	9
Swift	57	**63**	**-30**	**-52** *	-68	-28
Cuckoo	89	**-3**	**54** *	**54** *	25	95
Feral Pigeon	75	**-34** *	**-27**	**-18**	-43	13
Stock Dove	31	**-62**	**46**			
Woodpigeon	243	**-16** *	**11**	**12**	-11	39
Collared Dove	62	**-24**	**2**	**9**	-34	74
Oystercatcher	143	**-5**	**-19** *	**-39** *	-50	-28
Lapwing	88	**-3**	**-39** *	**-56** *	-67	-43
Golden Plover	37	**-10**	**8**	**-7**	-35	38
Curlew	131	**10**	**-20** *	**-59** *	-68	-48
Snipe	66	**-26** *	**-21**	**22**	-11	59
Common Sandpiper	37	**5**	**-11**	**-24** *	-43	-5
(Grey Heron)	57	**-9**	**-3**	**16**	-20	68
Buzzard	167	**-9**	**-4**	**30** *	11	67
Gt Spotted Woodpecker	66	**-20**	**22** *	**399** *	268	655
Kestrel	39	**-59** *	**-44** *	**-61** *	-77	-38
Jay	41	**40**	**61** *			
Magpie	64	**14**	**36** *	**62** *	24	131
Jackdaw	141	**35**	**20**	**47** *	12	97
Rook	124	**5**	**-12**	**-34** *	-49	-9
Carrion Crow	226	**-10**	**-10**	**-7**	-25	21
Hooded Crow	56	**25**	**-30** *	**-44** *	-58	-22
Raven	61	**2**	**33**	**63** *	6	131
Coal Tit	151	**12**	**-12**	**-4**	-22	22
Blue Tit	192	**1**	**-1**	**7**	-7	28
Great Tit	184	**-1**	**-3**	**48** *	26	82
Skylark	237	**-10** *	**-7**	**-4**	-15	11
Sand Martin	37	**-17**	**17**	**64**	-40	494
Swallow	207	**-12**	**-28** *	**6**	-10	25
House Martin	81	**4**	**-2**	**110** *	47	219

Species	Min. sample	1-year (18–19)	10-year (08–18)	23-year (95–18)	LCL	UCL
Long-tailed Tit	36	**19**	**29**	**63** *	4	143
Willow Warbler	245	**19** *	**10** *	**25** *	10	47
Chiffchaff	79	**-2**	**174** *	**836** *	483	1,514
Sedge Warbler	62	**-7**	**-22**	**14**	-22	77
Blackcap	85	**30** *	**100** *	**539** *	351	896
Garden Warbler	31	**19**	**-20**			
Whitethroat	98	**16**	**19**	**130** *	39	232
Goldcrest	103	**24**	**-19**	**20**	-11	74
Wren	262	**21** *	**-4**	**55** *	38	80
Treecreeper	42	**-15**	**-19**	**-7**	-37	28
Starling	167	**22**	**-18** *	**-29** *	-44	-5
Blackbird	231	**-5**	**3**	**31** *	8	57
Song Thrush	208	**5**	**16** *	**38** *	16	64
Mistle Thrush	88	**-17**	**2**	**14**	-10	63
Robin	230	**4**	**-5**	**22** *	7	40
Stonechat	43	**84** *	**-29** *	**99** *	37	235
Wheatear	91	**2**	**-38** *	**-39** *	-52	-21
House Sparrow	117	**-6**	**12**	**51** *	18	92
Tree Sparrow	34	**-1**	**122** *	**426** *	106	1,103
Dunnock	163	**1**	**-19** *	**29** *	11	53
Grey Wagtail	34	**3**	**-23**	**-2**	-32	35
Pied Wagtail	154	**16**	**-12** *	**-22** *	-36	-8
Meadow Pipit	241	**-1**	**15** *	**-10**	-20	0
Tree Pipit	41	**10**	**35** *	**80** *	36	144
Chaffinch	277	**-6**	**-18** *	**-5**	-15	7
Bullfinch	51	**24**	**35**	**36**	-7	107
Greenfinch	107	**-10**	**-68** *	**-67** *	-76	-55
Linnet	100	**3**	**-16**	**-6**	-29	24
Lesser Redpoll	58	**-23**	**72** *	**67** *	12	132
Crossbill	34	**-23**	**-33** *			
Goldfinch	122	**4**	**53** *	**224** *	154	324
Siskin	88	**-11**	**-17** *	**18**	-12	53
Yellowhammer	124	**11**	**6**	**24** *	2	48
Reed Bunting	72	**-4**	**4**	**70** *	36	131

Wales – population trends

Chaffinch declined by 38% in Wales between 1995 and 2018

Trends for 60 species are reported for Wales using BBS data. Fifty-eight of these are reported for the 23-year period and two species, Grey Wagtail and Lesser Redpoll, reached the reporting threshold for 10- and five-year trends only. Of the 58 species, one (Yellowhammer) has a 23-year trend and the standard one-year (1998–2019) change but does not reach the reporting thresholds for 10- and five-year trends.

STATISTICALLY SIGNIFICANT RESULTS

Period	No. species	Greatest change in Welsh trends	
Long-term (95–18) increases	**16**	Red Kite:	**413%**
Long-term (95–18) declines	**12**	Swift:	**-72%**
Short-term (18–19) increases	**7**	Siskin:	**89%**
Short-term (18–19) declines	**2**	Mistle Thrush:	**-24%**

FINCHES IN WALES

As with the other country trends, Wales follows suit with a **Greenfinch** decline of 71% between 1995 and 2018 and by 78% over the last 10 years alone (2008–18). The five-year **Greenfinch** trend for Wales (available online at www.bto.org/bbs-tables), shows a decline of 58% between 2013 and 2018. The graph below-right illustrates these declines since 2005, when the trichomonosis outbreak was first detected in **Greenfinch**.

A spatial analysis using BBS data was conducted just as trichomonosis hit. Figure 5, from this analysis, shows that **Greenfinch** had been doing very well, with positive relative change in density in large parts of lowland Wales – by over 75% in many cases between 1994–96 and 2007–09. If this exercise were repeated today, it would surely show a very different picture.

Data from the Common Birds Census, the predecessor to the BBS, can be combined with BBS data to provide trends running from the 1960s. This combined trend shows fluctuations in the **Greenfinch** populations, and the apparent increase during the first few years of BBS look to be part of these longer-term fluctuations. Recent declines, however, dwarf the historical CBC/BBS fluctuations.

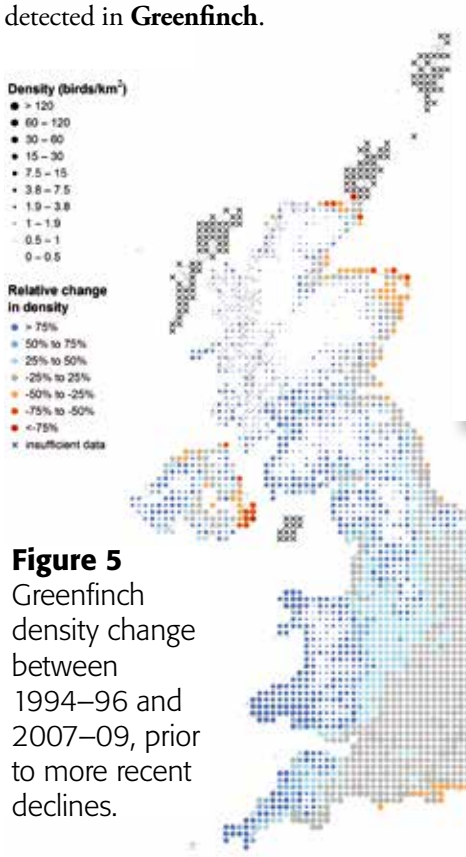
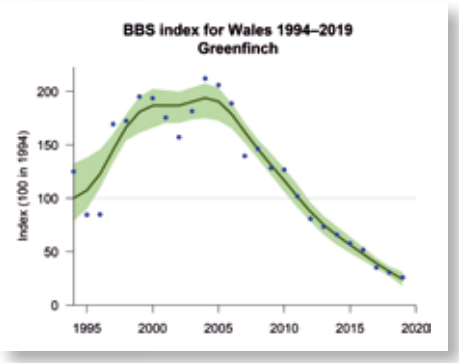


Figure 5 Greenfinch density change between 1994–96 and 2007–09, prior to more recent declines.



Chaffinch also shows a strong decline in Wales since 1994 and is steeper during the last 10 years (by 38% and 28% respectively). More research is needed, but trichomonosis has been detected in **Chaffinch** populations.

WHEATEARS AND RABBITS

Another seemingly common species in Wales, the **Wheatear**, has declined by 48% since 1994. As it is a summer visitor to the UK and long-distance migrant to sub-Saharan Africa, pressures faced during migration and on its wintering grounds could be playing a part in this decline. In Wales, sward height and declines in **Rabbit** populations (by 58% between 1996 and 2018, see page 29) could be causing losses of suitable grassland habitats – but more research is needed before this theory becomes more than speculative.

FIND OUT MORE...

Douglas, D.J.T., Beresford, A., Selvidge, J., Garnett, S., Buchanan, G.M., Gullett, P. & Grant, M.C. 2017. Changes in upland bird abundances show associations with moorland management. *Bird Study* **64**: 242–254.

Gibbons, D.W., Reid, J.B. & Chapman, R.A. 1993. *The New Atlas of Breeding Birds in Britain and Ireland: 1988–1991.* T. & A.D. Poyser, London.

Massimino, D., Johnston, A., Noble, D.G. & Pearce-Higgins, J.W. 2015. Multi-species spatially-explicit indicators reveal spatially structured trends in bird communities. *Ecological Indicators* **58**: 277–285.

CHAFFINCH: TOM STREETER/BTO

Table 7 Trends in Wales during 2018–19, 2008–18 and 1995–2018.

Species	Min. sample	1-year (18–19)	10-year (08–18)	23-year (95–18)	LCL | UCL
Pheasant	108	**-3**	**1**	**46** *	1 | 109
Canada Goose	33	**-1**	**20**	**359** *	139 | 1,073
Mallard	75	**12**	**-9**	**-21**	-58 | 27
Swift	66	**43**	**-50** *	**-72** *	-81 | -58
Cuckoo	64	**-1**	**23**	**-29**	-55 | 12
Feral Pigeon	39	**10**	**13**	**44** *	7 | 110
Stock Dove	35	**17**	**10**	**54**	-13 | 152
Woodpigeon	210	**-3**	**-9**	**12**	-5 | 35
Collared Dove	82	**-17**	**-2**	**13**	-25 | 76
Curlew	31	**34**	**-44** *	**-69** *	-80 | -53
(Grey Heron)	45	**16**	**5**	**0**	-40 | 46
Red Kite	34	**-26**	**120** *	**413** *	175 | 971
Buzzard	157	**5**	**-9**	**-8**	-25 | 11
Gt Spotted Woodpecker	96	**-4**	**3**	**189** *	105 | 307
Green Woodpecker	47	**-31**	**-12**	**-29**	-49 | 3
Jay	83	**-21**	**5**	**52** *	16 | 106
Magpie	178	**-3**	**-14** *	**-43** *	-61 | -19
Jackdaw	155	**18**	**-9**	**7**	-32 | 91
Rook	82	**59**	**-50** *	**-58** *	-72 | -42
Carrion Crow	227	**0**	**-8**	**4**	-12 | 22
Raven	104	**-3**	**-11**	**29**	-14 | 109
Coal Tit	84	**10**	**-10**	**-32** *	-53 | 0
Blue Tit	198	**-7**	**-19** *	**-8**	-19 | 7
Great Tit	190	**-12**	**-21** *	**19** *	4 | 37
Skylark	112	**6**	**0**	**-11**	-27 | 13
Swallow	190	**-15**	**-22** *	**7**	-17 | 30
House Martin	93	**-11**	**-17**	**-19**	-43 | 18
Long-tailed Tit	68	**76** *	**-25**	**14**	-24 | 67
Willow Warbler	173	**29** *	**-3**	**-16**	-31 | 4
Chiffchaff	162	**8**	**22** *	**54** *	30 | 83

Species	Min. sample	1-year (18–19)	10-year (08–18)	23-year (95–18)	LCL | UCL
Blackcap	146	**9**	**58** *	**143** *	92 | 219
Garden Warbler	62	**2**	**-6**	**-18**	-46 | 24
Whitethroat	93	**23** *	**-15**	**-28** *	-43 | -6
Goldcrest	92	**27** *	**-12**	**-54** *	-68 | -27
Wren	220	**11** *	**13** *	**9**	-8 | 31
Nuthatch	81	**-3**	**1**	**30** *	4 | 62
Treecreeper	45	**30**	**17**	**22**	-19 | 95
Starling	83	**-14**	**-18**	**-65** *	-77 | -47
Blackbird	220	**1**	**-2**	**43** *	32 | 54
Song Thrush	185	**13**	**-17** *	**18**	-2 | 38
Mistle Thrush	111	**-24** *	**0**	**8**	-16 | 37
Robin	214	**-10** *	**-7**	**-6**	-15 | 8
Redstart	70	**21**	**-3**	**1**	-19 | 31
Stonechat	45	**64** *	**8**	**191** *	100 | 375
Wheatear	59	**5**	**-41** *	**-48** *	-59 | -32
House Sparrow	141	**4**	**13**	**92** *	53 | 147
Dunnock	173	**0**	**0**	**32** *	11 | 54
Grey Wagtail	34	**60**	**-8**		
Pied Wagtail	131	**16**	**-10**	**2**	-17 | 32
Meadow Pipit	100	**4**	**-9**	**-15**	-30 | 3
Tree Pipit	37	**-11**	**-18**	**-31**	-54 | 3
Chaffinch	218	**-9**	**-28** *	**-38** *	-46 | -27
Bullfinch	70	**25**	**-7**	**-12**	-29 | 14
Greenfinch	110	**-16**	**-78** *	**-71** *	-80 | -59
Linnet	101	**-6**	**5**	**-25**	-44 | 3
Lesser Redpoll	35	**-38**	**0**		
Goldfinch	150	**-8**	**27** *	**104** *	69 | 164
Siskin	34	**89** *	**45**	**84** *	11 | 237
Yellowhammer	31	**-22**		**-64** *	-77 | -52
Reed Bunting	31	**-8**	**0**	**34**	-8 | 100

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

Northern Ireland – population trends

Mallard increased by 242% in Northern Ireland between 1995 and 2018

Thirty-seven species reach the 30 square reporting threshold for Northern Ireland. Of these, 34 species reach the threshold for the 23-year, 10- and five-year trends. For Skylark, only the 23-year trend is reported, for Sedge Warbler there are the 10- and five-year totals and Lesser Redpoll reaches the threshold for a 10-year trend. For all 37 species, there is also the standard one-year change for 2018 to 2019.

STATISTICALLY SIGNIFICANT RESULTS

Period	No. species	Greatest change in NI trends	
Long-term (95–18) increases	**17**	Blackcap:	**1,540%**
Long-term (95–18) declines	**2**	Greenfinch:	**-82%**
Short-term (18–19) increases	**5**	Chiffchaff:	**43%**
Short-term (18–19) declines	**0**		

NEW 'ALL-TIME' TREND

Mallard now reaches the reporting threshold for the long-term, 23-year trend, meaning it joins the other 34 species for which we can report trends for all the time periods considered for this report. The trend shows a 242% increase between 1995 and 2018.

Increases in the number of species reaching reporting thresholds will assist in identifying those changes in need of further research. As yet, little is known about breeding season population change in **Mallard** in Northern Ireland. Separating counts of wild-bred birds and those released for shoots is no easy task, and the trend no doubt includes counts for both.

The BBS trend for Northern Ireland is an interesting contrast to the *Wetland Bird Survey* (www.bto.org/webs) trend which shows a decline in wintering populations, likely due to a reduction in the number of overwintering birds from the Continent and Iceland.

DECLINES

Of the 35 species with long-term trends (23-year), eight are showing declines and of those, two are statistically significant: **Greenfinch** and **Skylark**.

For **Greenfinch**, reduced survival due to trichomonosis is the main named cause of the decline, with Northern Ireland showing the most drastic long-term decline of all the country trends, by 82% between 1995 and 2018.

Skylark has declined by 46% between 1995 and 2018 in Northern Ireland. Changes in agricultural practices, including a switch from spring to autumn sowing of cereals, resulting in vegetation which is too high for late nesting attempts for the multi-brooded **Skylark**, as well as herbicide use, reducing the amount of weed-seed in winter stubbles, are all thought to have played a role in declines across the UK.

GOOD NEWS

A massive increase of 1,540% between 1995 and 2018 has been recorded for **Blackcap** in Northern Ireland. The *Bird Atlas 2007–11* map shown in Figure 6 illustrates the gains in breeding distribution across Northern Ireland and the Republic of Ireland since 1988–91 as this species colonised new ground.

A combination of climate change, earlier laying dates than in the late 1980s and their short-distance migration are thought to have benefited the species and allowed the range expansion seen in the north and west of the UK and into Ireland, as well as population increases within the existing range.

The increasing trend seen in the UK is mirrored across Europe where **Blackcap** shows a moderate increase, as monitored by the Pan-European Common Bird Monitoring Scheme (PECBMS). Many of the individuals benefiting from garden feeding stations and berry-bearing shrubs in the UK during the winter months are birds which breed in central Europe.

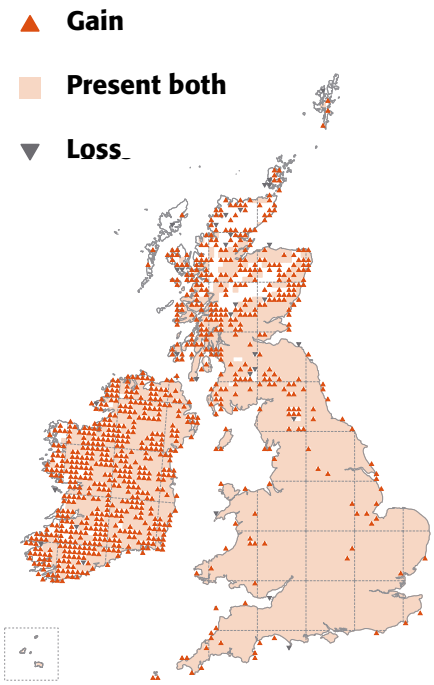


Figure 6 Blackcap breeding distribution change from 1988–91 to 2007–11, as illustrated in the *Bird Atlas 2007–11.*

FIND OUT MORE...

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

Table 8 Trends in Northern Ireland during 2018–19, 2008–18 and 1995–2018.

Species	Min. sample	1-year (18–19)	10-year (08–18)	23-year (95–18)	LCL	UCL
Pheasant	44	5	-24 *	104 *	24	312
Mallard	30	47	36	242 *	5	468
Woodpigeon	88	5	23 *	116 *	65	175
Collared Dove	37	-9	49 *	116 *	35	399
Buzzard	35	-3	33 *	1,305 *	563	4,470
Magpie	86	5	-14 *	-2	-29	20
Jackdaw	80	5	14	72 *	34	137
Rook	76	16	-17	-21	-46	22
Hooded Crow	85	42 *	51 *	179 *	107	261
Coal Tit	66	-9	-19 *	32	-10	88
Blue Tit	80	-7	-6	8	-26	41
Great Tit	77	10	-5	135 *	85	195
Skylark	31	12		-46 *	-63	-33
Swallow	87	-15	-33 *	-18	-37	20
House Martin	48	-10	33 *	83 *	19	208
Willow Warbler	83	17 *	-11 *	38 *	19	78
Chiffchaff	37	43 *	6	12	-13	48
Sedge Warbler	33	-4	-48 *			
Blackcap	46	33 *	151 *	1,540 *	991	4,450
Goldcrest	48	1	-30	33	-8	112
Wren	95	3	8	72 *	24	119
Starling	82	-1	3	26	-9	89
Blackbird	89	-6	7	44 *	15	81
Song Thrush	81	5	3	65 *	26	112
Mistle Thrush	60	-7	-20 *	-13	-57	72
Robin	92	0	4	25	-2	49
House Sparrow	59	12	10	36	-7	162
Dunnock	73	-3	-5	64 *	15	134
Pied Wagtail	49	10	2	41	-7	147
Meadow Pipit	64	7	-6	7	-19	57
Chaffinch	94	-6	-7	28 *	1	48
Bullfinch	35	24	9	17	-19	69
Greenfinch	42	-4	-86 *	-82 *	-89	-63
Linnet	37	33	-52 *	-15	-45	40
Lesser Redpoll	34	2	-53 *			
Goldfinch	55	22 *	22 *	485 *	273	1,340
Reed Bunting	33	4	-23 *	-28	-52	26

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 covered an impressive 29 squares in total.

CHANNEL ISLANDS

Data for 83 species were submitted from the Channel Islands in 2019. The most numerous species were Woodpigeon, Carrion Crow, Wren and Blackbird. Singles of Spoonbill, Garganey and Firecrest added a little interest and, of course, the trusty Short-toed Treecreeper remained on the BBS list of annual sightings thanks to a square on the south coast of Guernsey.

Data from 12 squares included mammal recording and 13 contained Detection Type. Thanks are due to the 17 volunteers and Regional Organisers on the Channel Islands who ensured 21 squares were surveyed. Thank you.

FIRECREST: NEIL CALBRADE, WREN: ALLAN DREWITT/BTO

ISLE OF MAN

For the Isle of Man, a doubling in coverage was the big news story of 2019 – a fantastic effort by the Regional Network team on the island and the BBS volunteers themselves. Not only that, an Upland Rovers square has been taken on and reverted back to a 'core' BBS square, with two visits annually. A fantastic effort, thank you all.

Data from six squares included mammal recording and there were seven with Detection Type data. Pheasant, Herring Gull and Wren were the most numerous species, with a Hen Harrier and Chough seen once and twice respectively, giving the species list that Manx feel.

English regions – population trends

489
23-year trends
calculated in English Regions

Population trends have been calculated for nine English regions for a total of 79 species. Oystercatcher joins the trend set for the North East, and Corn Bunting also reaches the reporting threshold for the first time, in the South East.

CORN BUNTING: CHRIS KNIGHTS/BTO

Here, trends are reported for English regions where the given species has been recorded on 30 or more squares per year, on average, since the survey was launched in 1994. The results can be seen in Table 10 and a summary of these trends, along with the 2019 coverage by region, can be seen in Table 9. Additional 10-, five- and one-year changes for English regions can be viewed online: www.bto.org/bbs-results.

Each trend is accompanied by a sample size and for statistically significant trends, an asterisk. For more information on thresholds and statistical significance, see page 13. In future, as coverage increases, the aim is to report regional trends for other countries within the UK.

REGIONAL DIFFERENCES

Whether it be **Buzzard** populations expanding from west to east or **Ring-necked Parakeets** colonising new ground outside London, the breeding distribution for some species is changing. These expansions, contractions and shifts in range can often be detected within BBS English Region trends.

The general northerly direction of expansion or shift is often attributed to climate change, and for some species, such as **Nuthatch**, **Willow Warbler** and **Blackcap**, this may well be part of the reason. For **Nuthatch**, the milder mean winter temperatures are thought to have facilitated their expansion northwards, as seen by the particularly large increases in the North West. On the Continent, seed-crop in autumn was found to be an important factor – could this also be playing a part in the expansion in Britain?

Willow Warbler is part of the 'long-distance migrant' group undergoing long-term decline, where changes to wintering and migration grounds are thought to be having a negative impact. In addition, egg-laying dates are a week earlier and changes in productivity vary across regions, with declines seen particularly in southern England and the Midlands and increases revealed in Scotland. Likewise, between the 1960s and 2000s, the laying date for **Blackcap** has advanced by 18 days. Again, this is thought to be influenced by climate change. **Blackcap** does not migrate nearly as far as **Willow Warbler** and has a varied diet, even taking advantage of garden feeding stations in colder spells. **Blackcap** continues to increase across the English regions.

COMPLEX TRENDS

With **Buzzard** having expanded eastwards following the ban in the use of harmful organochlorines and a reduction in persecution, will **Raven** follow in its wing beats and reach the reporting thresholds for other regions in addition to the West Midlands?

With so many species reported within English regions and so much variety from one species to the next, it is important to remember the breadth of possible influencing factors faced by bird communities and it is important to understand each species in turn. Many of the population changes seen here are reflected in the maps from the *Bird Atlas 2007–11* (www.bto.org/mapstore).

Table 9 Counties in each region, coverage in 2019, trends produced, and statistically significant changes.

Region		Counties	Number of squares covered in 2019	No. of trends	Significant increases	Significant declines
1	North West	Cheshire, Cumbria, Lancashire, Greater Manchester, Merseyside	251	57	19	16
2	North East	Cleveland, County Durham, Northumberland	157	40	8	8
3	Yorkshire & Humber	East Yorkshire, North Lincolnshire, North Yorkshire, South Yorkshire, West Yorkshire	283	56	21	11
4	East Midlands	Derbyshire, Northamptonshire, Leicestershire & Rutland, Lincolnshire, Nottinghamshire	302	58	19	10
5	East of England	Bedfordshire, Cambridgeshire, Essex, Hertfordshire, Norfolk, Suffolk	376	68	23	21
6	West Midlands	Birmingham, Herefordshire, Shropshire, Staffordshire, Warwickshire, Worcestershire	220	54	24	12
7	South East	Berkshire, Buckinghamshire, Hampshire, Isle of Wight, Kent, Oxfordshire, Surrey, Sussex	674	68	20	25
8	South West	Avon, Cornwall, Devon, Dorset, Gloucestershire, Somerset, Wiltshire	573	61	16	15
9	London	Greater London	92	27	13	8

Table 10 Trends in English regions during 1995–2018.

Species	North West		North East		Yorkshire & Humber		East Midlands		East of England		West Midlands		South East		South West		London	
	95–18	Sample	95–18	Sample	95–18	Sample	95–18	Sample	95–18	Sample	95–18	Sample	95–18	Sample	95–18	Sample	95–18	Sample
Red Grouse					**15**	51												
Red-legged Partridge					**21**	56	**-51** *	79	**-11**	184	**26**	36	**106** *	129	**135** *	64		
Grey Partridge					**-68** *	30	**-29**	32	**-55** *	43								
Pheasant	**158** *	147	**29**	76	**68** *	158	**-6**	165	**-12**	285	**81** *	146	**27** *	411	**65** *	296		
Canada Goose	**161** *	74			**174** *	34	**16**	45	**22**	60	**34** *	73	**45** *	128	**108** *	54		
Greylag Goose					**932** *	44	**704** *	34	**101** *	51			**105**	42				
Mute Swan									**120**	43			**-27**	58	**31**	38		
Shelduck									**-5**	37								
Mallard	**19**	161	**62**	36	**20**	110	**18**	112	**-8**	195	**35** *	121	**23**	249	**29**	164	**-28**	44
Tufted Duck													**40**	31				
Swift	**-74** *	106	**-72** *	33	**-55** *	86	**9**	82	**-38** *	151	**-56** *	73	**-62** *	172	**-62** *	146	**-57** *	59
Cuckoo	**-51** *	33			**-62** *	44	**-83** *	48	**-71** *	103	**-78** *	51	**-73** *	159	**-83** *	72		
Feral Pigeon	**-41** *	76			**-50** *	64	**-36**	51	**-19**	77	**-39**	43	**-15**	112	**-22**	70	**-23** *	74
Stock Dove	**35**	60			**83** *	59	**-4**	81	**8**	150	**63** *	89	**51** *	222	**27**	139		
Woodpigeon	**65** *	222	**22**	89	**91** *	183	**40** *	204	**27** *	332	**22** *	187	**21** *	513	**51** *	373	**46** *	84
Turtle Dove									**-95** *	55			**-96** *	39				
Collared Dove	**23**	134	**-27**	35	**-32** *	86	**26**	114	**33** *	212	**-34** *	117	**-8**	305	**-7**	203	**-23**	53
Moorhen	**-18**	69			**4**	41	**-34** *	61	**-23** *	126	**-20**	60	**-39** *	145	**-12**	71		
Coot	**6**	31					**7**	30	**-12**	39	**94** *	31	**1**	67				
Oystercatcher	**2**	62	**16**	30	**266** *	52			**58** *	35								
Lapwing	**-25** *	116	**-17**	49	**0**	113	**-47** *	62	**-39** *	74	**-47** *	38	**-59** *	100				
Curlew	**-52** *	91	**-27** *	52	**1**	117												
Snipe					**130**	39												
(Cormorant)									**-18**	49			**55**	53	**-11**	34		
(Grey Heron)	**-39** *	78			**4**	37	**-30**	52	**-41** *	83	**2**	58	**-19**	129	**-26**	86		
Sparrowhawk	**-36** *	33							**-28**	46			**-39** *	66	**-23**	50		
Red Kite													**18,255***	86				
Buzzard	**139** *	80	**7,095***	32	**718** *	47	**1,879***	68	**24,195***	83	**193** *	104	**1,160***	192	**12**	243		
Gt Spotted Woodpecker	**118** *	90	**150** *	31	**93** *	55	**163** *	67	**57** *	153	**134** *	112	**81** *	329	**140** *	182	**39** *	39
Green Woodpecker							**251** *	51	**79** *	174	**42** *	66	**8**	319	**-3**	137	**25**	31
Kestrel	**-35** *	70			**-30**	63	**15**	68	**-7**	112	**-35** *	42	**-34** *	137	**-49** *	78		
Ring-necked Parakeet													**604** *	36			**25,700***	48
Jay	**24**	72					**24**	35	**32** *	123	**-23**	64	**-13** *	248	**2**	117	**-16**	41
Magpie	**-15**	187	**-18**	39	**-24** *	107	**36**	155	**27** *	251	**-8**	166	**5**	436	**-12** *	309	**37** *	83
Jackdaw	**123** *	150	**15**	67	**61** *	129	**181** *	134	**138** *	235	**111** *	145	**71** *	397	**40** *	295		
Rook	**-38** *	90	**-29** *	50	**-32**	116	**11**	104	**15**	184	**3**	89	**-3**	266	**-26** *	232		
Carrion Crow	**54** *	230	**-9**	87	**35** *	187	**31** *	192	**83** *	311	**10**	185	**18** *	497	**11**	368	**61** *	84
Raven											**116** *	32			**-5**	82		
Coal Tit	**57** *	75	**39**	44	**66**	49	**5**	42	**-2**	69	**38**	52	**16**	163	**34** *	111		
Marsh Tit													**-30** *	53	**-2**	31		
Blue Tit	**-6**	208	**-15**	69	**-4**	161	**40** *	189	**22** *	311	**-5**	185	**-5**	499	**-6**	356	**7**	83
Great Tit	**59** *	195	**56** *	62	**36** *	142	**60** *	177	**22** *	295	**19** *	180	**18** *	487	**47** *	346	**121** *	78
Skylark	**-40** *	120	**-23** *	75	**0**	156	**-16**	165	**-26** *	284	**-14**	119	**-25** *	325	**-39** *	232		
Swallow	**-21** *	199	**-22**	80	**-29** *	167	**40** *	158	**-12**	230	**-21** *	147	**-3**	333	**6**	314		
House Martin	**-44**	98	**-26**	31	**-10**	71	**58**	60	**-39** *	99	**-42** *	81	**-56** *	146	**-40** *	155		
Long-tailed Tit	**38**	87			**19**	55	**77** *	85	**25** *	160	**-8**	91	**-12**	260	**38** *	162	**66** *	34
Willow Warbler	**-5**	148	**-30** *	72	**-17**	122	**-57** *	95	**-81** *	110	**-59** *	90	**-81** *	150	**-63** *	153		
Chiffchaff	**289** *	112	**310** *	49	**316** *	89	**387** *	114	**141** *	222	**151** *	149	**49** *	399	**27** *	313	**111** *	35
Sedge Warbler									**-30**	45			**-13**	35	**-21**	34		
Reed Warbler									**-3**	41			**-26**	34				
Blackcap	**307** *	124	**74** *	46	**132** *	100	**162** *	134	**119** *	254	**150** *	144	**139** *	417	**142** *	300	**203** *	49
Garden Warbler	**-18**	30					**-22**	34	**-33** *	60	**-19**	46	**-33** *	101	**-29** *	64		
Lesser Whitethroat							**32**	38	**29**	79	**49** *	31	**-18**	59	**-7**	44		
Whitethroat	**-23**	89	**48** *	44	**5**	88	**69** *	145	**9**	257	**18** *	110	**36** *	311	**0**	221		
Goldcrest	**95** *	49	**44**	30			**82** *	33	**60** *	80	**108** *	49	**25** *	210	**-28** *	140		
Wren	**33** *	220	**6**	83	**41** *	186	**31** *	194	**31** *	307	**29** *	182	**14** *	491	**12** *	364	**38** *	78
Nuthatch	**328** *	48							**163** *	35	**160** *	55	**81** *	204	**86** *	95		
Treecreeper									**-17**	31			**-3**	99	**-8**	54		
Starling	**-54** *	175	**-51** *	62	**-63** *	127	**-43** *	136	**-50** *	231	**-70** *	129	**-65** *	340	**-71** *	197	**-63** *	80
Blackbird	**66** *	220	**16**	79	**47** *	179	**32** *	202	**6**	325	**28** *	188	**2**	512	**20** *	374	**-31** *	84
Song Thrush	**91** *	171	**-1**	67	**90** *	125	**21**	147	**-2**	246	**72** *	159	**-4**	446	**12**	313	**-36** *	52
Mistle Thrush	**-14**	120	**-16**	42	**-31** *	84	**-15**	85	**-57** *	133	**-18**	88	**-57** *	230	**-47** *	131	**-59** *	33
Robin	**53** *	211	**31** *	75	**57** *	158	**33**	190	**24** *	305	**41** *	185	**11** *	496	**12** *	360	**83** *	81
Wheatear	**-43**	52			**-19**	48												
House Sparrow	**3**	162	**-28**	47	**-3**	105	**15**	127	**-21** *	198	**-7**	145	**-26** *	317	**12**	250	**-67** *	70
Tree Sparrow	**35**	31			**208** *	45	**23**	33										
Dunnock	**18** *	183	**26**	63	**1**	137	**13**	179	**18** *	280	**28** *	171	**5**	443	**10**	331	**23** *	64
Yellow Wagtail							**-46** *	39	**-44** *	49								
Grey Wagtail															**-21**	33		
Pied Wagtail	**-7**	132	**-7**	51	**-17**	109	**-28** *	100	**-4**	153	**-6**	88	**-21** *	207	**-17**	158		
Meadow Pipit	**-13**	91	**-15**	57	**1**	107	**-54** *	41	**-60** *	41			**-44** *	49	**-24**	50		
Chaffinch	**-18** *	219	**0**	87	**9**	184	**-1**	199	**-21** *	323	**-50** *	183	**-38** *	495	**-34** *	366	**24**	57
Bullfinch	**-14**	44			**205** *	32	**28**	56	**-24** *	66	**6**	56	**-22** *	142	**2**	119		
Greenfinch	**-59** *	151	**-63** *	44	**-64** *	103	**-52** *	139	**-53** *	248	**-52** *	138	**-69** *	374	**-70** *	268	**-59** *	57
Linnet	**-29** *	92	**-38**	51	**-23**	100	**-27**	123	**-11**	179	**-19**	76	**-36** *	231	**-18**	191		
Goldfinch	**133** *	173	**161** *	58	**153** *	133	**232** *	148	**116** *	228	**238** *	135	**121** *	359	**128** *	290	**483** *	54
Corn Bunting									**-36** *	39			**-46** *	30				
Yellowhammer	**-63** *	53	**-46** *	45	**-24** *	92	**-5**	142	**-25** *	223	**-58** *	102	**-42** *	253	**-29** *	171		
Reed Bunting	**-10**	66			**95** *	48	**41** *	68	**46** *	85			**-34** *	62	**26**	35		

INTERPRETING THE RESULTS: see page 13 **MORE REGIONAL TRENDS:** www.bto.org/bbs-results

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 the 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, Great Black-backed, Herring and Lesser 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 Common Tern, Cormorant, Grey Heron and Little Egret are reported with the caveat that counts may contain a high proportion of birds away from breeding sites.
- Trends for Barn Owl and Tawny Owl are reported with the caveat that the BBS monitors nocturnal species poorly.
- Counts for six wader species (Oystercatcher, Lapwing, Golden Plover, Curlew, Snipe 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

Rabbit declined by 64% in the UK between 1996 and 2018

BBS mammal data are used to produce population trends for nine mammal species for the UK as a whole, countries and English regions.

Mammal monitoring was conducted on 3,605 squares (90%) of the 4,005 BBS squares surveyed. Here, population trends for the UK's most easily detected and widespread terrestrial mammal species are presented.

Mammal recording is an optional extra to the BBS bird counts, so it is fantastic to have these data collected on 90% of squares – thank you to all who took part.

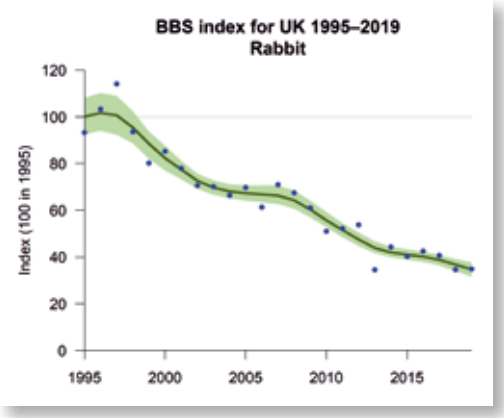
For each species where reporting thresholds are met (40+ squares for the UK and 30+ squares for countries and English regions), all-time (22-year), 10-year and 2018 to 2019 trends are displayed. Five-year trends are available online at www.bto.org/bbs-mammals.

DATA TYPE BREAKDOWN

Of squares surveyed, there was no evidence of mammal presence in 417, despite monitoring for mammals. These are known as 'null returns' and are equally as important as counts and evidence of mammals on squares.

Evidence of presence, via local knowledge, dead mammals or signs of mammals, was recorded for 149 squares.

The remaining 3,039 squares provided records of live mammals, seen and counted during Early or Late visits.



RABBITS AND HARES

Rabbit declines can be seen across the UK – at the UK level through to country and English region trends. The greatest decline was recorded in the East Midlands (88% between 1996 and 2018) and Scotland (83% during the same period). When studying the 10-year trends for **Rabbit**, the decline shows no sign of slowing.

The trends for **Brown Hare** and **Mountain/Irish Hare** are less certain in most cases, but do indicate declines in the areas and periods shown. Only **Brown Hare** shows long-term (1996–2018) statistically significant population changes, with declines of 40% in the North West of England and by 31% in the South East.

Detailed information on lagomorph population changes can be found on pages 30 and 31.

▲ One BBS surveyor got a surprise when surveying his BBS square south of Haverhill – a Red-necked Wallaby!

Table 11 All mammal species recorded in 2019.

Species	Squares recorded
Red-necked Wallaby	2
Brown Hare	1,042
Mountain/Irish Hare	86
Rabbit	1,798
Grey Squirrel	1,277
Red Squirrel	29
European Beaver	2
Water Vole	6
Field Vole	25
Bank Vole	16
Wood Mouse	21
Harvest Mouse	1
House Mouse	4
Brown Rat	56
Lesser White-toothed Shrew	1
Water Shrew	1
Common Shrew	35
Pygmy Shrew	2
Mole	476
Hedgehog	39
Wild Boar	6
Bottle-nosed Dolphin	1
Harbour Porpoise	1
Roe Deer	914
Red Deer	170
Sika Deer	19
Fallow Deer	118
Reeves' Muntjac	266
Chinese Water Deer	12
Park Cattle	7
Feral Goat	10
Daubenton's Bat	1
Natterer's Bat	1
Pipistrelle Bat sp.	7
Domestic Cat	370
Red Fox	502
Grey Seal	12
Common Seal	8
Otter	27
Pine Marten	14
Badger	284
Stoat	35
Weasel	14

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

RED-NECKED WALLABY: CHRIS BLACKMAN

BROWN HARE: TOM MAYSON

Table 12 Mammal trends in **UK**.

Species	Min. sample	1-year (18–19)	10-year (08–18)	22-year (96–18)	LCL	UCL
Brown Hare	741	**13** *	**0**	**-4**	-14	7
Mountain/Irish Hare	54	**-12**	**27**	**-41**	-63	4
Rabbit	1,458	**1**	**-43** *	**-64** *	-70	-58
Grey Squirrel	794	**14** *	**5**	**14** *	2	27
Roe Deer	465	**17** *	**29** *	**86** *	60	113
(Red Deer)	70	**30**	**16**	**48**	-9	120
(Fallow Deer)	65	**26**	**44**	**92**	-1	291
Reeves' Muntjac	110	**12**	**52** *	**172** *	88	323
Red Fox	283	**-16**	**-32** *	**-44** *	-52	-36

Table 13 Mammal trends in **England**.

Species	Min. sample	1-year (18–19)	10-year (08–18)	22-year (96–18)	LCL	UCL
Brown Hare	632	**13** *	**-4**	**-4**	-14	6
Rabbit	1,198	**10** *	**-45** *	**-53** *	-59	-47
Grey Squirrel	710	**14** *	**7**	**15** *	3	29
Roe Deer	359	**9**	**22** *	**89** *	60	127
(Fallow Deer)	61	**-6**	**58** *	**118** *	38	239
Reeves' Muntjac	110	**12**	**51** *	**170** *	79	322
Red Fox	228	**-5**	**-39** *	**-49** *	-56	-40

Table 14 Mammal trends in **Scotland**.

Species	Min. sample	1-year (18–19)	10-year (08–18)	22-year (96–18)	LCL	UCL
Brown Hare	82	**9**	**6**	**-6**	-35	27
Rabbit	115	**-12**	**-42** *	**-83** *	-90	-73
Roe Deer	105	**28** *	**40** *	**87** *	43	146
(Red Deer)	49	**34**	**8**	**12**	-31	90

Table 15 Mammal trends in **Wales**.

Species	Min. sample	1-year (18–19)	10-year (08–18)	22-year (96–18)	LCL	UCL
Rabbit	94	**-13**	**-53** *	**-58** *	-71	-28
Grey Squirrel	59	**7**	**8**	**10**	-13	33

Table 16 Mammal trends in **Northern Ireland**.

Species	Min. sample	1-year (18–19)	10-year (08–18)	22-year (96–18)	LCL	UCL
Rabbit	45	**4**	**12**	**-32**	-56	16

NOTE:

Trends are displayed in the same way as they are for the birds. 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 on a given BBS visit could influence the overall trend.

Table 17 Mammal trends in **English regions**.

Species	North West		North East		Yorkshire & Humber		East Midlands		East of England		West Midlands		South East		South West		London	
	96–18	Sample	96–18	Sample	96–18	Sample	96–18	Sample	96–18	Sample	96–18	Sample	96–18	Sample	96–18	Sample	96–18	Sample
Brown Hare	**-40** *	63	**18**	31	**6**	77	**29**	94	**4**	148	**-23**	42	**-31** *	103	**-6**	74		
Rabbit	**-46** *	108	**-68** *	41	**-20**	121	**-88** *	112	**-51** *	208	**-62** *	112	**-66** *	298	**-42** *	187		
Grey Squirrel	**94** *	61			**-13**	36	**47**	48	**15**	104	**-14**	77	**6**	216	**32** *	110	**42** *	52
Roe Deer					**189** *	35			**99** *	30			**74** *	127	**41** *	107		
Reeves' Muntjac									**151** *	51			**123** *	36				
Red Fox									**-26**	31			**-31** *	65	**-58** *	46		

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

Losing lagomorphs to disease

Population trends produced using BBS mammal data are showing alarming signs for the UK's lagomorphs – when was the last time you saw a dead Rabbit at the roadside?

By **Prof. Diana Bell**, Conservation Biologist, University of East Anglia

In 1984, a new species of calicivirus 'Rabbit haemorrhagic disease virus' (RHDV1) was discovered in China in domestic strains of European Rabbit. It spread rapidly to at least nine European countries and Mexico during the mid to late 1980s.

TRANSMISSION

RHDV1 transmission was related to commercial trade in live domestic Rabbits and their products. The disease was reported in the UK in 1992 and is highly contagious among lagomorphs, with mortality rates of 80–90% reported due to acute viral hepatitis; it is very resistant and transmission occurs via numerous routes. Although the development of vaccines have subsequently been used to protect domestic Rabbits, the virus has had serious impacts on wild Rabbit *Oryctolagus cuniculus* populations including across their ancestral Iberian peninsular range where, for example, more than 60% of the wild Rabbit population died in Spain during the initial outbreak.

ECOSYSTEM ENGINEERS

Rabbits have become keystone ecosystem engineers and of course an important mammal/avian prey item in the UK. With a wild Rabbit decline of 64% recorded by BBS mammal monitoring between 1996 and 2018, it is worth highlighting the potential impact on Rabbit-dependent habitats in the UK such as such as Breckland and the chalk downs. They also play a valuable conservation role in arable pasture to grass heath reversion. We have been advising land managers about techniques that may be used to help restore Rabbit numbers where their loss threatens biodiversity. Furthermore, researchers have also voiced concern over the potential impact of Rabbit losses on offshore islands, like Skokholm, for hole-nesting seabird species such as Manx Shearwater and Puffin. The ecological effects on UK biodiversity after the dramatic decline in wild Rabbits due to myxomatosis (introduced to the UK in 1952) was well reviewed but the consequences of new Rabbit haemorrhagic diseases are yet to be determined.

A characteristic external symptom of RHDV1 is nasal haemorrhage, but no evidence of these symptoms or increased mortality were observed in our long-term research into the population biology of wild Rabbits at the University of East Anglia (UEA), despite population crashes being reported on National Nature Reserves in nearby Breckland. A second novel virus, RHDV2, was first detected in commercially farmed domestic European Rabbits in northern France in 2010. It also spread rapidly throughout Europe and was detected in Australia in May 2015 and North America in 2019. Subsequent analysis of archived Rabbit tissues indicated RHDV2 presence in UK Rabbits as early as 2010.

Vaccination against RHDV1 does not protect Rabbits against RHDV2 for which a second vaccine was developed, and it has been suggested that the latter virus did not evolve from the former, due to genetic differences between the two. Initial reports for domestic Rabbits indicated an available mortality rate of 5–70% from RHDV2 but two confirmed outbreaks in our UEA wild Rabbit population in 2016 and 2019 indicated far higher losses of >90%, including young emerging from underground nests on weaning at 21 days. In contrast to RHDV1, these young infected with RHDV2 show no haemorrhagic symptoms at time of death but appear very lethargic or paralysed if found alive above ground, with many dying underground in their burrows.

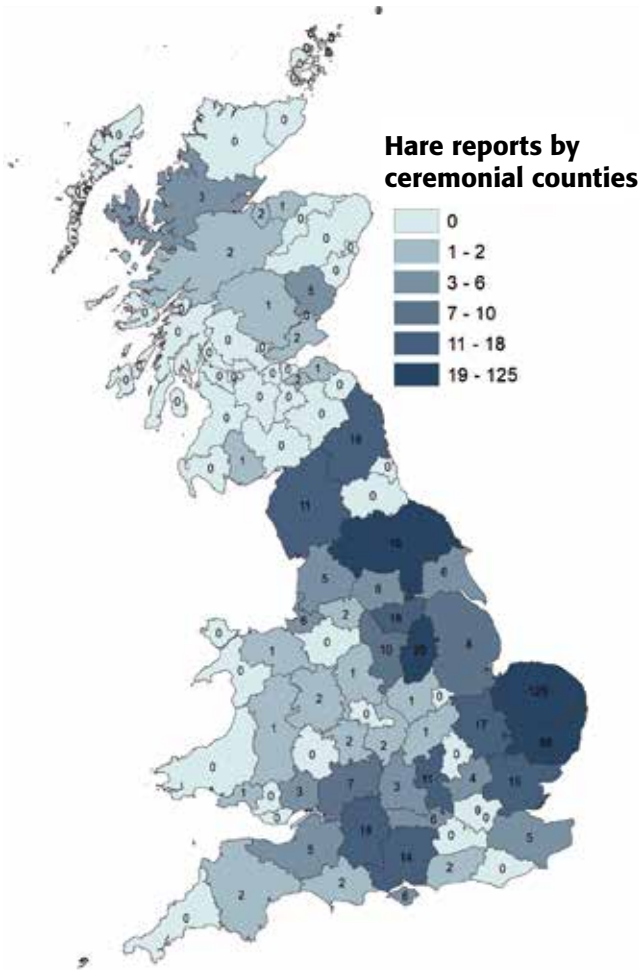


Figure 7 Number and location of dead hare species (non-roadkill or coursed) reported between mid October 2018 and end April 2019.

FALCONERS

Unlike in France and Spain, the epidemiology of RHDV2 has yet to be studied in detail in the UK. We collaborated with falconers in the UK and the Republic of Ireland by circulating questionnaires in December 2015 and January 2016 asking whether they had observed any changes in Rabbit populations. One hundred responses were received: 83% reported decreases in Rabbit numbers in their locality, 70% stated that these declines had been sudden and by more than 75% in counties across the UK and in the Republic of Ireland. In some counties, falconers reported that wild Rabbits had disappeared completely at that time.

HARES

Unlike RHDV1 which was species-specific, RHDV2 has been confirmed to also cause fatal hepatitis in five species/subspecies of hares: European Brown Hare *Lepus europaeus*, Cape Hare *Lepus capensis* subspecies *mediterraneus,* Italian Hare *Lepus corsicanus*, the Mountain Hare *Lepus timidus* and its subspecies endemic to Ireland *Lepus timidus hibernicus*.

The first recorded cases of RHDV2 in European Brown Hares were from Italy in 2012 and France the following year although there is suggestion the spillover occurred earlier in France, soon after its emergence in Rabbits there in 2010. In 2015, RHDV2 was found to account for 40% of lagovirus disease in Brown Hares in France where it was now spatially widespread. Researchers highlighted concern about viral recombination occurring after discovering co-infection of two Brown Hares by RHDV2 and another virus – European Brown Hare Syndrome Virus (EBHSV).

The Brown Hare is a Priority Species in the UK Biodiversity Action Plan (BAP), having declined by an estimated 80% in the past century, as reported by the Hare Preservation Trust. Unlike other European countries, England and Wales have no closed season for shooting this species and efforts to reintroduce hares in Germany have been unsuccessful. Agricultural changes and illegal hare coursing are included amongst the primary current threats to Brown Hares in the UK.

REPORTING

In September 2018, I started to receive reports from members of the public of hares dying. A citizen-science appeal for information was then launched and from mid October to the end of April 2019, 514 dead/dying individuals were reported from *c*.50 counties across England, Scotland and Wales – see Figure 7. In addition, 89 general reports of hare die-offs, often of multiple individuals from locations across the UK were logged. It is estimated that over 500 further reports of dead hares have been received between May 2019 and March 2020 and these have yet to be added to the database.

We have been collecting animals for post-mortem and diagnostics and confirmed RHDV2 in Brown Hare in England in 2019, and colleagues subsequently confirmed its presence in Scotland. Other pathogens, including EBHSV, have also been found but diagnostics are still in progress. This includes cases of hares presenting with ocular symptoms typical of those seen in Rabbits infected with myxomatosis. Iberian Hares *Lepus granatensis* with symptoms of myxomatosis were recorded in Spain and Portugal in 2018 and 2019 and a new recombinant myxoma virus (named MYXV Toledo) was identified as the cause of a resulting widespread die-off. A reported detection of RHDV2 in Mediterranean Pine Voles *Microtus duodecimcostatus* and white-toothed shrews is also concerning for ecosystems. Furthermore, in April 2020, RHDV2 was confirmed in yet another lagomorph genus namely American cottontails *Sylvilagus* and sympatric North American *Lepus* species in New Mexico.

SUMMARY

In summary, new caliciviruses RHDV1 and RHDV2 are contributing to major decline in wild Rabbit populations in the UK and across continental Europe. Given that myxomatosis is also still present, population recovery from this viral cocktail is unlikely in the short term. The long-term trends in wild Rabbit numbers reported by BBS mammal monitoring indicate declines from 1995 to 2000 in regions including England, Wales and the East of England which may be related to RHDV1 impact, although the subsequent recoveries to around 2005–07 apparent in these parts of the UK did not occur in data for Scotland. The appearance of a second novel virus RHDV2 around 2010 is likely to be contributing to the continuing wild Rabbit decline visible in this database in subsequent years.

We have been collecting evidence for a wide-scale die-off in Brown Hares across the UK since September 2018 and have confirmed that RHDV2 has jumped from Rabbits to this species, as it has in other countries and indeed, to other *Lepus* species. An important question is whether all 35 species of globally distributed *Lepus* hares are also susceptible to RHDV2. This would be the first simultaneous decline of Rabbits and hare species in European ecosystems and the impacts of these on other taxa need to be investigated and increased legislative protection for Brown Hares provided.

FIND OUT MORE...

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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.

Two-hundred and forty-five volunteers took part in the WBBS in 2019 and this effort resulted in 280 waterway stretches being covered. The distance walked by volunteers when actively surveying WBBS transects in 2019 was the equivalent of walking from BTO HQ in Thetford to Faro in southern Portugal! Thank you to all who have contributed to the survey in 2019.

BBS ONLINE FOR WBBS

Further developments have been made to BBS Online, within which WBBS data are entered. These updates include new functions available to volunteers and Regional Organisers, including more advanced data download options for those wanting to examine their own data or to provide feedback to landowners of squares surveyed. See page 4 for the latest news on this.

DATA COLLECTION

Of the 280 stretches covered, 264 were covered twice, once for the Early visit and once for the Late. Whenever possible, it is important to carry out two visits to the WBBS site in order to gather information on the species more likely to be detected in the Early or Late visit.

Detection Type, whether a bird was first detected by sight, song or call, was recorded on 76% of sites, Mammal Recording was carried out on 88% of squares and Colony Recording occurred on 54 squares – the most frequently recorded colonies in WBBS since 1998 are those of Sand Martin.

SIGHTINGS IN 2019

All data are equally valuable, but for interest the rarer species encountered in 2019 included Cattle Egret in Shropshire, White-tailed Eagle along the River Thurso, and two Golden Eagles just outside Fort William. The most widespread species were Wren and Woodpigeon, recorded on 96% and 93% of sites respectively. The most numerous species were Woodpigeon and Mallard.

The site with the most species recorded was along the Gloucester and Sharpness Canal, with 66 species logged. Just three sites had fewer than 10 species; all three were in remote areas of the Cairngorms. Overall, the average species count for a site in 2019 was 38 species, compared to the average of 30 bird species recorded on BBS squares.

Table 18 Number of WBBS stretches surveyed.

	England	Scotland	Wales	Northern Ireland	UK total
1998	133	27	8	0	**168**
1999	133	36	14	3	**186**
2000	129	32	14	1	**176**
2001*	38	12	1	0	**51**
2002	151	49	26	2	**228**
2003	178	53	30	1	**262**
2004	191	59	37	0	**287**
2005	210	52	39	0	**301**
2006	202	57	32	4	**295**
2007	190	48	32	0	**270**
2008	200	48	27	1	**276**
2009	212	47	25	1	**285**
2010	204	43	22	1	**270**
2011	207	44	19	3	**273**
2012	204	57	20	3	**284**
2013	206	52	22	2	**282**
2014	203	53	26	2	**284**
2015	214	61	27	2	**304**
2016	215	57	29	2	**303**
2017	222	55	25	3	**305**
2018	218	49	23	2	**292**
2019	206	50	22	2	**280**

**2001: foot-and-mouth disease*

METHOD AND PURPOSE

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

GREAT CRESTED GREBE: TOM STREETER/BTO

COVERAGE

The Waterways Breeding Bird Survey started in 1998 and, following initial increases, coverage has remained fairly stable since 2004. A current limitation to the survey is that there is no way of creating new WBBS stretches using the same sampling technique as was used to create the original set of sites used today. Work continues on the development of a new approach that accounts for waterways appropriately.

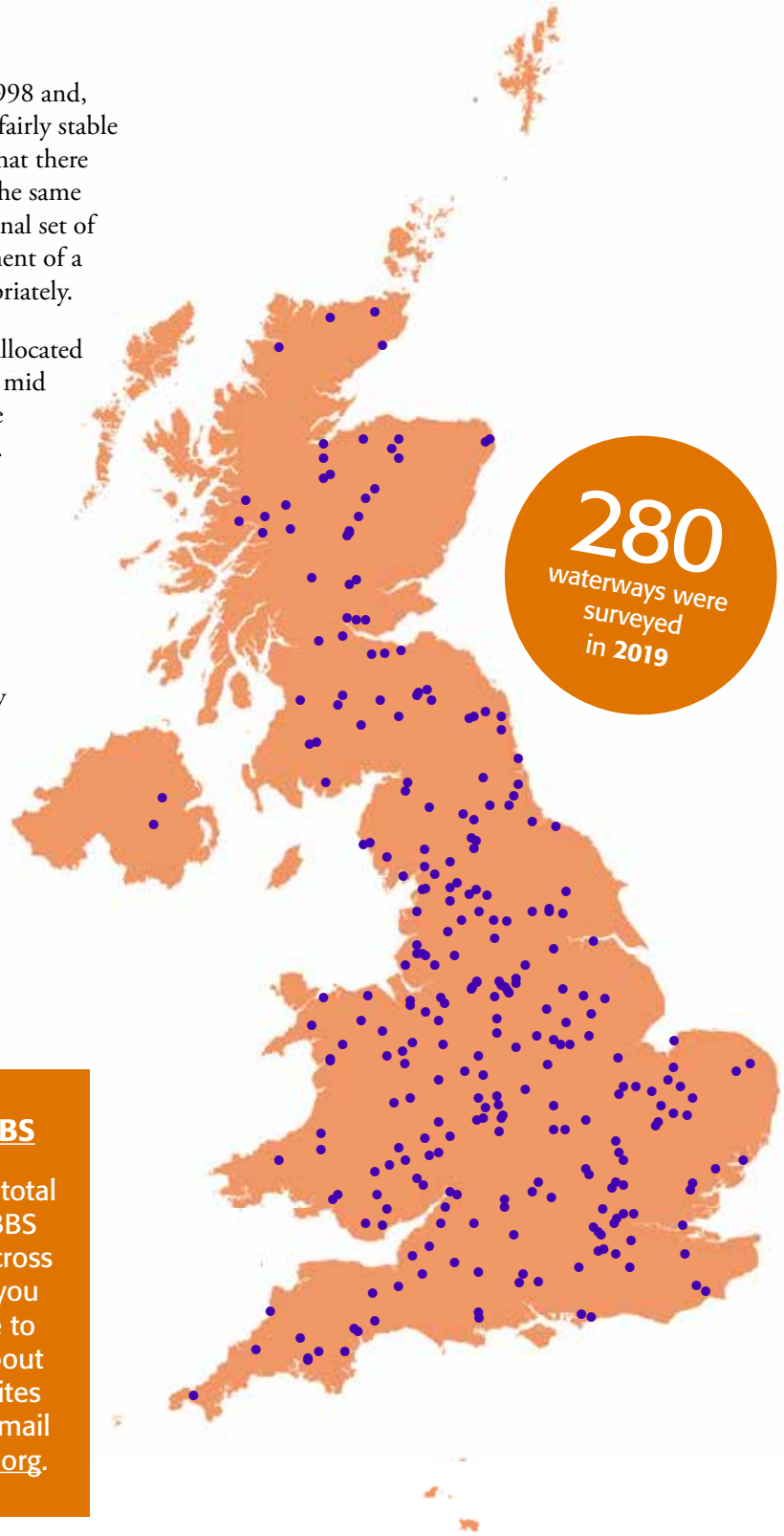
Some existing stretches across the UK remain unallocated and are available for surveying. Northern Ireland, mid Wales, north-east England and north Scotland are obvious gaps where existing sites await volunteers.

Same challenge, different survey! As with the BBS, upland and remote areas are the biggest challenge to coverage. However, WBBS does punch above its weight. With fewer sites than BBS, each site is relatively rich in species and birds.

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 remedy, especially when we have willing volunteers in both these areas.

THANK YOU!

A big thank you to all the WBBS observers who covered sites in 2019, and to the Regional Organisers who make this happen locally: we couldn't do it without you all!



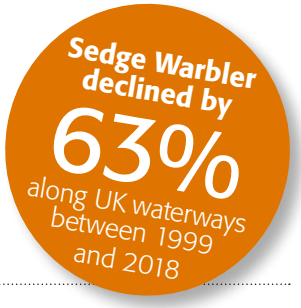
Species	Sample
Shelduck	26
Mandarin	25
Gadwall	22
Little Grebe	17
Great Crested Grebe	21
Snipe	20
Redshank	20

Table 19 Additional species of interest for WBBS but for which sample size is currently just too low to calculate robust trends from the survey.

JOIN WBBS

There are a total of 654 WBBS stretches across the UK. If you would like to find out about available sites near you, email wbbs@bto.org.

United Kingdom – WBBS population trends



The WBBS produces population trends for 24 species associated with waterways and which reach the reporting threshold of being recorded on an average of 30 squares or more since the survey began in 1998. These trends monitor the health of this habitat type specifically, rather than for all UK habitat types overall, as in the Breeding Bird Survey.

STATISTICALLY SIGNIFICANT RESULTS

Period	No. species	Greatest change in WBBS trends	
Long-term (99–18) increases	**0**		
Long-term (99–18) declines	**10**	Sedge Warbler:	**-63%**
Short-term (18–19) increases	**6**	(Cormorant):	**57%**
Short-term (18–19) declines	**0**		

WBBS trends are produced for various time periods; 'all-time' (19-year), 10- and five-year, as well as the one-year change (2018–19). The five-year trends are available online (www.bto.org/volunteer-surveys/wbbs/results).

For some species, the average number of sites on which a species is recorded is just below the reporting threshold – see Table 19, page 33. With increases in coverage, species distribution or species abundance, or a combination of all three, it may be possible to report trends for these species in the future.

DECLINES PROMINENT

A clear message from these latest WBBS trends is that many more species are declining than increasing, and many of the declines reported by WBBS are substantially greater than 25%. The suite of declining species includes a diverse mixture of residents and migrants, species with a vegetarian diet, molluscivores, omnivores and those dependent on riverine insects.

FISH-EATERS

Grey Heron is the only large fish-eater that has declined on WBBS (-29%, 1999–2018), with **Cormorant** and **Goosander** numbers faring well, but counts of the wide-ranging colonial herons and **Cormorants** on WBBS, and BBS, may reflect foraging habits rather than accurately reflecting breeding numbers.

POTENTIAL CAUSES

Declines are evident among breeding waders such as **Oystercatcher** (-39%), **Lapwing** (-59%) and **Curlew** (-53%) since 1998. All of these species occupy wet grasslands often associated with linear waterways. These waders occupy a range of lowland and upland open habitats and their declines and range contraction have been well documented. These have been attributed to reduced productivity as a result of habitat loss and degradation, high levels of grazing, mowing regimes and increased pressure from nest predators.

Moorhen populations are known to be susceptible to cold winters, and the current decline, along linear waterways as well as in all habitats monitored by BBS, follows a population peak in the mid 2000s. **Coot** populations, although favourable in the longer term, have also shown declines in recent decades and especially along waterways. A potential pressure on these two widespread species is the spread of the invasive American Mink.

The most surprising WBBS result is the rapid, 61% decline in **Tufted Duck** since 1998. Favouring a diet of molluscs, this species has increased over the last century with the spread of the invasive Zebra Mussel. The contrast with the increase on BBS, which covers a broader range of wetland habitats, including ponds and urban parks, is difficult to explain and suggests different pressures in different habitats. Although showing only non-significant WBBS declines, **Reed Warbler** and **Reed Bunting** are also faring better on BBS sites. For **Reed Bunting**, this could be due to its switch to occupying mainly agricultural habitats and the more recent benefits of environmental stewardship options such as weedy stubbles and wild-bird crops.

Many of the species showing significant declines (**Grey Wagtail**, **Pied Wagtail**, **Dipper**, **Common Sandpiper**) depend to a large extent on aquatic insects in or near the river channel. However, a recent study (Outhwaite *et al.* 2020) has found increases in the range of most freshwater insects since the early 1990s. Following earlier declines, these increases have been attributed to reductions in riverine pollutants as a result of better river management.

Sedge Warbler also feeds on insects associated with wetlands and its WBBS trend is the steepest decline, 63% since 1998. However, populations of this species are known to fluctuate, being strongly associated with rainfall on their wintering grounds in the Sahel region of Africa. **Common Sandpiper** is another migratory species, the causes of its decline attributed to a combination of pressures on the breeding grounds and during migration.

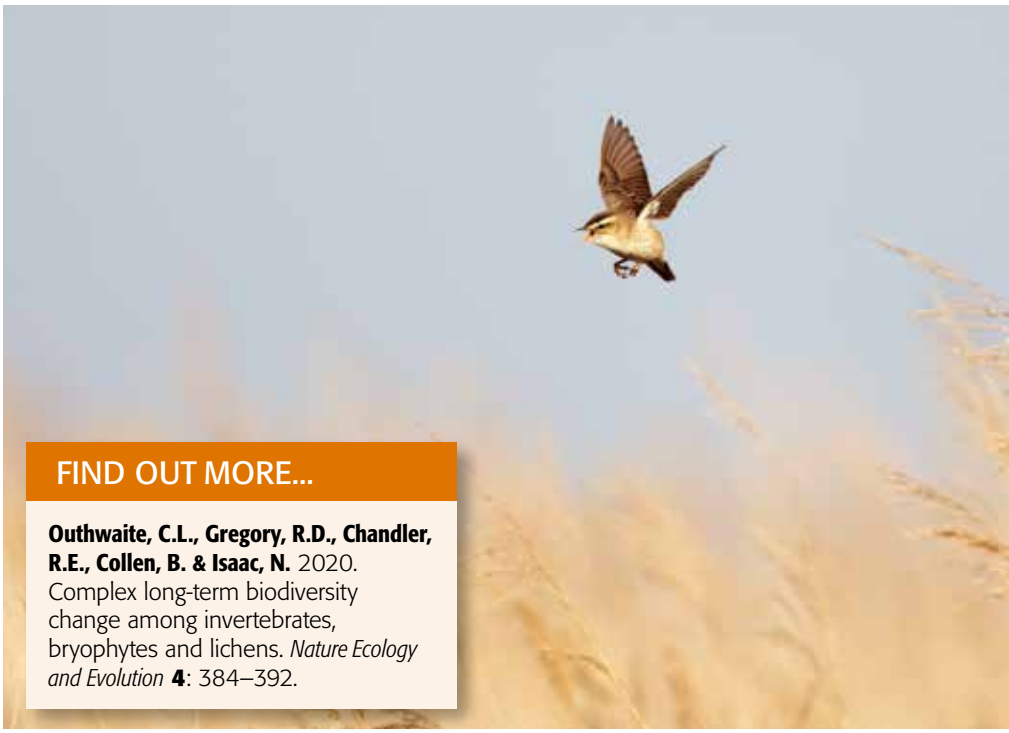
Two invasive species that, like **Coot**, are dependent on vegetation – **Canada Goose** and naturalised **Greylag Goose**

– continue to increase, whereas **Mute Swan** numbers have been largely stable along waterway habitats since 1998.

OVERALL...

These WBBS results reveal some concerning declines for which there are so far no clear explanations. Freshwater habitats are vulnerable to many pressures including loss and degradation of adjacent habitats, river canalisation and disturbance, increased flooding, pollutants and the spread of a wide range of non-native plants and animals with the capacity to rapidly alter habitat conditions.

Further work is needed to elucidate the cause of these population changes and the role of different drivers.



FIND OUT MORE...

Outhwaite, C.L., Gregory, R.D., Chandler, R.E., Collen, B. & Isaac, N. 2020. Complex long-term biodiversity change among invertebrates, bryophytes and lichens. *Nature Ecology and Evolution* **4**: 384–392.

Table 20 UK population trends during 2018–19, 2008–18 and 1999–2018.

Species	Min. sample	1-year (18–19)	10-year (08–18)	19-year (99–18)	LCL	UCL
Canada Goose	102	**4**	**-22**	**45**	-18	157
Greylag Goose	57	**18**	**19**	**71**	-19	249
Mute Swan	113	**-28**	**-17** *	**-11**	-34	15
Mallard	238	**4**	**-13** *	**-7**	-17	4
Tufted Duck	44	**-1**	**-55** *	**-61** *	-76	-13
Goosander	55	**-31**	**36**	**31**	-14	84
Moorhen	149	**25** *	**-23** *	**-26** *	-38	-11
Coot	70	**23** *	**-44** *	**-37** *	-66	-6
Oystercatcher	78	**-9**	**-24** *	**-39** *	-51	-23
Lapwing	78	**-18**	**-36** *	**-59** *	-73	-44
Curlew	61	**5**	**-9**	**-53** *	-71	-37
Common Sandpiper	69	**1**	**-19** *	**-32** *	-45	-16

Species	Min. sample	1-year (18–19)	10-year (08–18)	19-year (99–18)	LCL	UCL
(Common Tern)	31	**-17**	**-25**	**-28**	-51	12
(Cormorant)	71	**57** *	**22**	**11**	-33	50
(Grey Heron)	178	**-4**	**-23** *	**-29** *	-37	-19
Kingfisher	72	**1**	**-10**	**-14**	-35	17
Sand Martin	77	**48** *	**29**	**38**	-14	119
Sedge Warbler	92	**40**	**-46** *	**-63** *	-76	-46
Reed Warbler	58	**11**	**-5**	**-16**	-38	8
Whitethroat	132	**39** *	**-4**	**8**	-8	27
Dipper	92	**-13**	**-7**	**-18**	-35	12
Grey Wagtail	130	**-12**	**-20** *	**-17**	-30	0
Pied Wagtail	155	**-6**	**-19**	**-40** *	-53	-23
Reed Bunting	113	**22** *	**-19** *	**-15**	-29	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 below 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 2019:

ENGLAND

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

NORTHERN IRELAND

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

We currently have vacancies for Regional Organisers for WBBS in Angus, Essex (South), London (North), Lincolnshire (South), Merseyside, Norfolk (North-West), Wigtown and Yorkshire (South-East).

SEDGE WARBLER: GRAHAM CATLEY/BT

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 2019:

ENGLAND

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

SCOTLAND

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

WALES

Anglesey	Ian Hawkins
Brecknock	Andrew King
Caernarfon	Geoff Gibbs
Cardigan	Moira Convery (now Naomi Davis)
Carmarthen	**VACANT** (now Paul Aubrey)
Clwyd (East)	Anne Brenchley
Clwyd (West)	Mel ab Owain
Glamorgan (Mid, South)	Wayne Morris
Glamorgan (West)	Lyndon Jeffery
Gwent	Richard Clarke
Merioneth	Dave Anning
Montgomery	Jane Kelsall
Pembrokeshire	Annie Haycock
Radnorshire	Carlton Parry

NORTHERN IRELAND

Antrim & Belfast	Kevin Mawhinney
Armagh	Stephen Hewitt
Down	Alastair McIlwain
Fermanagh	Michael Stinson
Londonderry	John Clarke
Tyrone	Michael Stinson

CHANNEL ISLANDS

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

ISLE OF MAN

Isle of Man	David Kennett

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

Many thanks are due to the following ROs who retired during the past year, having supported the BBS in their regions: Moira Convery, Graham Cooper, Hugh Dorrington, Aidan Gill, Harry Green, Alan Heavisides, Dave McGarvie (Borders), Graham Oliver and Bob Osborne, as well as BTO Northern Ireland Officer Shane Wolsey.

We would like to thank and welcome Paul Aubrey, Steve Davies (Worcestershire), Naomi Davis, Nicholas Gibbons, Bob Knight, Claire Marsden, Dave McGarvie (Ayrshire), Stephen Metcalfe, Sean Murphy, Neil Stratton and Brian Walker who have taken over as ROs during the past year. Contrary to the information displayed on the 2018 BBS Report, we are pleased to say that Lynda Milner remains the BBS and WBBS Regional Organiser for Nottinghamshire. Andrew Bielinski, Grant Bigg and Steve Willis are kindly providing temporary cover for Wigtown, Yorkshire (South-East) and Angus, respectively.

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