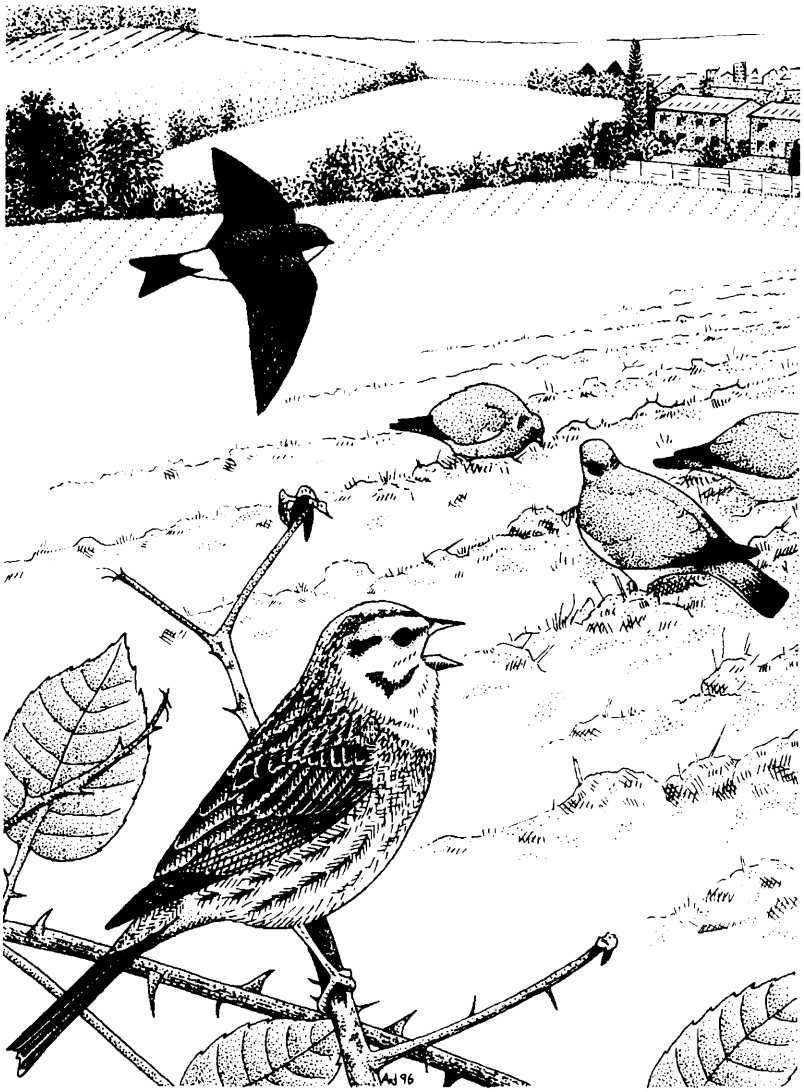
The Breeding Bird Survey 1998



British Trust for Ornithology

JOINT NATURE CONSERVATION COMMITTEE

RSPB

The Breeding Bird Survey 1998

Report Number 4

by

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BREEDING BIRD SURVEY

The Breeding Bird Survey partnership comprises:

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ACKNOWLEDGEMENTS

The fourth BBS Annual Report for the Breeding Bird Survey (BBS) allows us to look at the progress of the scheme over a five-year period (1994-1998). We have also detailed the changes from the most recent two years 1997-1998. The data have been collected from 2297 squares representing a massive effort from our volunteer fieldworkers and Regional Organisers. We would like to take this opportunity to thank everyone who has contributed to the success of the BBS so far.

The BBS is organised by the British Trust for Ornithology (BTO), and funded jointly by BTO, the Joint Nature Conservation Committee (JNCC, on behalf of English Nature, Scottish Natural Heritage, Countryside Council for Wales and the Environment and Heritage Service in Northern Ireland) and the Royal Society for the Protection of Birds (RSPB). The BBS Steering Group comprises David Stroud (JNCC), Dr Richard Gregory (RSPB), Dr Stephen Baillie (BTO) and Dr David Noble (BTO).

We are grateful to the following people who have provided assistance to the scheme since its inception: Dr Mark Avery (RSPB), Lyn Aylward (BTO), Dr Ian Bainbridge (RSPB), George Boobyer (JNCC), Tracey Brookes (BTO), the late Dr Steve Carter (BTO), Sonia Davies (BTO), Anita Donaghy (RSPB), Dr Colin Galbraith (JNCC), Dr David Gibbons (RSPB), Dr Jeremy Greenwood (BTO), Viv Hiom (BTO), Mike Meharg (EHS), Chris Morley (BTO), Ken Perry (BTO Honorary), Carol Povey (BTO), Nicki Read (BTO), Samantha Rider (BTO), Dr Ken Smith (RSPB), David Stroud (JNCC), Dr Derek Thomas (BTO Honorary), Susan Waghorn (BTO), Jane Wells (BTO) and Richard Weyl (EHS).

The Pilot Census Project, which was a forerunner of the BBS, was supported under a contract from the JNCC (on behalf of English Nature, Scottish Natural Heritage, Countryside Council for Wales and the Environment and Heritage Service in Northern Ireland). The project to evaluate sampling strategies was funded by the RSPB. Members of the BTO's Integrated Population Monitoring Working Group, Dr Rhys Green, Prof. Steve Buckland, Dr Nicholas Aebischer, Dr John Goss-Custard, Dr Dorian Moss, David Stroud, Dr Ken Smith, Dr Jeremy Greenwood, Dr Will Peach and Dr Humphrey Crick, provided invaluable advice on the survey design.

Maps of coverage and distribution were produced using DMAP which was written by Dr Alan Morton. The cover illustration and BBS logo are by Andy Wilson. Other illustrations in this report are by Hilary Burn, Simon Gillings, Maxine Grover and Andy Wilson. Report production and design are by Samantha Rider.

This report is provided free to all BBS fieldworkers. Further copies are available from BTO HQ at a cost of £5 incl. p&p.

Profiles

Dr David Noble is the new Head of the Census Unit and oversees the running of bird surveys such as the CBC, WBS, WBBS and the BBS, as well as associated research on bird populations. Before joining the BTO he worked at Cambridge University on the relationships between cuckoos and their hosts, in the UK and in Africa.

Richard Bashford is the National Organiser of the BBS and is responsible for the day-to-day running of the scheme which involves liaison with BTO Regional Organisers and volunteers, promotion of the scheme and providing feedback by giving presentations around the country. Before working for the BTO, Richard worked as an Information Officer for the RSPB, coordinating the Birdbus project.

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The Breeding Bird Survey 1998

BBS

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Breeding Bird Survey

EXECUTIVE SUMMARY

1. This is the fourth annual report of the BTO/JNCC/RSPB Breeding Bird Survey (BBS), covering the years 1997 to 1998 and detailing progress since the scheme's introduction in 1994. The primary aim of the survey is to provide population trends for a range of common and widespread birds in the UK.

2. Survey plots are based on 1x1 km squares of the National Grid. Squares are chosen on the basis of a formal, stratified, random sampling design, with larger numbers of squares selected in regions with more potential volunteers. The same squares are surveyed year after year. Population indices are calculated using methods that remove the potential for sampling bias.

3. Volunteer observers visit their squares three times a year. The first visit is used to establish a transect route and to record details of land use and habitat type. The second and third are early morning counts to survey breeding birds. A line transect method is used, with birds recorded in distance bands. Each survey requires about five hours' fieldwork per year, enabling a large number of people to become involved across the UK.

4. The scheme is organised centrally by BTO Headquarters staff and regionally by voluntary Regional Organisers (ROs), who in most cases are BTO Regional Representatives. ROs play a vital role in co-ordinating and fostering local fieldwork effort.

5. While the majority of fieldwork is carried out by volunteers, professional fieldworkers, supported by RSPB and the Environment and Heritage Service in Northern Ireland, have covered a number of squares in remote parts of Scotland and Northern Ireland respectively in recent years.

6. Survey coverage and promotion during 1994-98 are discussed. The number of BBS squares covered each year has increased steadily from 1569 in 1994 to 2297 in 1998. The long-term aim is to survey 2-3000 squares on an annual basis and to increase the number of squares in areas that are not well-covered.

7. A total of 215 species was recorded in 1998. For about 100 species we were able to measure population changes with a medium to high degree of precision.

8. We have provided a Scottish BBS summary detailing population changes.

9. With increasing coverage in Wales, we have provided a Welsh-based summary.

10. Some preliminary work has been carried out using the three years of mammal data collected since the trial survey began in 1995.

A declining bird, the Tree Sparrow has disappeared from many areas and is now found on only 6% of all BBS squares. (Artwork by Hilary Burn)

INTRODUCTION

Changes in bird populations have long been recognised as a useful indicator of the health of our environment. Developments in our surroundings from urban growth, new roads and housing to changes in farming practices, all have an effect on bird populations and their habitats.

In recent years, it has become clear that we need to improve the monitoring of common land birds across the UK. Following a number of field- and desk-based studies, the BTO, in conjunction with the JNCC and the RSPB, introduced the Breeding Bird Survey (BBS) in 1994. The final design for the BBS combined the need for precise and detailed information with an efficient method. The simple and quick nature of fieldwork has allowed a large number of people to become involved across the UK.

Previous monitoring

The BTO has an international reputation for monitoring bird numbers based largely on the long-running Common Birds Census (CBC) which has been the main monitoring tool for common birds in the UK over the last 35 years. It is based on a survey method known as "territory mapping" which involves intensive fieldwork designed to map breeding territories of birds within a chosen plot. Skilled volunteers make typically nine or ten visits to their plot each year to record birds. Survey maps are returned to BTO HQ where the position and number of bird territories are assessed by trained staff.

The CBC has proved highly valuable in revealing population fluctuations among UK birds and helping to understand their causes. Long-term information of this kind is extremely rare and valuable for that reason. The CBC has played a key role in revising the conservation priorities of UK birds within the *status lists - Birds of Conservation Concern,* the *Birds of Conservation Importance,* and the *UK Biodiversity Action Plan* process reports.

Few monitoring programmes can compare with the quality and duration of the CBC. Despite its considerable achievements, there are a number of limitations to the territory mapping method as carried out by BTO:

- The geographical distribution of survey plots is not representative of the UK as a whole, with most squares in the south and east.
- Only farmland, woodland and riparian habitats are represented.
- Because observers choose areas they wish to census, the area sampled may not be representative of UK bird populations as a whole.
- Relatively few plots can be covered in total (approximately 230 CBC and 120 Waterways Bird Survey (WBS) plots) because of the time-consuming nature of the fieldwork and analysis required by the mapping method.

N.B. The CBC is currently being maintained at full strength to allow calibration with the BBS.

Aims of the BBS

Our reasons for setting up the BBS were:

- To improve the geographical scope of bird monitoring in the UK;
- To improve the habitat representation of bird monitoring in the UK; and
- To increase species coverage of bird monitoring in the UK, largely as a product of the points above.

The BBS aims to provide precise information on year-to-year and longer-term changes in population levels for a broad spectrum of our commoner breeding birds across the range of regions and habitats in the UK. Our primary objective is to identify declining species that require conservation action and, in combination with other data from the BTO/JNCC's Integrated Population Monitoring Programme, to provide pointers as to the causes of population changes.

In a wider context, the BBS will promote a greater understanding of UK birds through a unique partnership of large numbers of skilled

volunteers with a small number of professional staff at BTO HQ. The result is high quality monitoring information collected in a highly cost-effective manner.

In terms of population trends the BBS will provide:

- Trends for as many species as possible for the UK as a whole, because this information is essential for bird conservation.
- Trends for individual countries within the UK. This information is required by the three country agencies (English Nature, Scottish Natural Heritage and the Countryside Council for Wales) and by the Environment and Heritage Service in Northern Ireland.
- Trends for European Union (EU) regions within the UK. The EU Birds Directive is a key piece of legislation in international bird conservation.
- Trends by habitat type. Conservation of particular species and habitat types will be greatly improved by a more complete understanding of relationships between birds and habitats.

SURVEY METHODS

Selecting survey squares

Survey squares are selected at random from within 83 sampling regions across the UK. In most cases, these are standard BTO regions, but a few smaller regions have been linked with larger ones. BBS regions with larger numbers of potential volunteers are allocated a larger number of squares enabling more birdwatchers to become involved in these areas. This does not introduce bias in our results because the analysis takes account of differences in area and sampling intensity between regions.

Survey design

The principal features of BBS are:

- Standardised bird counts are made in randomly selected 1-km squares of the National Grid.
- An initial site visit is made to set up two 1-km line transects and to record habitat and land use details.
- Two morning visits are made to count birds of all species seen or heard. Birds are recorded from the transect line in one of three distance categories or as in flight.
- Fieldwork is coordinated through a network of BBS Regional Organisers, who, like most of the fieldworkers, are volunteers.

Fieldwork

Full details of methods are given in the BBS instructions which we issue freely from BTO HQ. In brief, fieldwork involves three visits to each survey square each year. The first is to record details of the habitat and to establish the survey route, the second and third to count birds early and late in the season. Early counts take place between early April and mid-May, and late counts between mid-May and late June. Both the bird and habitat data are recorded on specially designed forms so that they can be readily processed.

The survey route is made up of two parallel lines, each 1 km in length, although for practical reasons routes typically deviate somewhat from the ideal. Each of these lines is divided into five sections, making a total of ten 200 m sections, and birds and habitats are recorded within these units. Habitat type and land use are recorded annually on a habitat form. Habitat information is essential for interpreting why bird numbers are changing through time and thus focusing conservation effort. BBS habitat recording is also valuable in its own right in measuring land use changes through time across the UK. In this respect, the survey is of unique value, because there are surprisingly few datasets of this scale.

Organisation

The survey is organised locally through a network of Regional Organisers (ROs), who are mostly BTO Regional Representatives. Each RO is provided with a list of target squares for their region at the beginning of each season with the instruction that squares should be allocated in strict order from the top downwards. The highest priority each year is to resurvey squares covered in the previous year and then to find volunteers for any gaps in the list. This ensures the random design of the scheme is maintained. The same squares are surveyed year after year and a new surveyor is found if the original one drops out.

Timetable

Survey forms are sent out to ROs at the start of each year with the bulk of fieldwork being completed between April and June. **We ask that completed forms are then returned to the ROs in July and August, and then on to BTO HQ.** While the great majority of forms are received by the late autumn, forms continue to trickle in, even into the New Year. While we very much welcome these late forms, they can cause difficulties in terms of data checking and inputting. Please try to get your forms back to us as soon as possible after completing fieldwork.

Once received by BTO HQ, the job of checking and processing can then begin in earnest and with 5000-10,000 separate forms this is a considerable task. Forms are checked by staff for clarity and obvious mistakes. They are then counted and sent away to be input, before final checking can be completed. All this obviously takes time and so results for any one year will not be available until the following spring or summer. The earlier we receive data, the quicker we are able to report the results back to participants.

Feedback

We acknowledge the safe receipt of BBS forms directly with observers when they reach BTO HQ. Each spring everyone taking part will receive a copy of *Census News*, the newsletter of the Census Unit, and in the autumn a copy of the BBS annual report. Survey news is also reported regularly in *BTO News*, the BTO's bimonthly membership magazine.

Species summaries

Many county-based bird reports have incorporated species summaries from BBS data. These are available from the Census Unit from May each year for the previous year's figures and include counts of common species which are often missing from local reports. Use of BBS data in this form also helps to promote the survey to potential volunteers.

Professional coverage

While the vast majority of fieldwork is carried out by skilled volunteers, professional input has been needed in some remote areas in the north and west. The RSPB and the Environment and Heritage Service in Northern Ireland have supported professional fieldwork in Scotland and Northern Ireland respectively, although 1998 was the last year of professional help in Scotland. While our aim in the medium term is to increase volunteer effort in these areas, this coverage has been extremely valuable in monitoring species and habitats that are rare within the BBS as a whole.

Mammal recording

Mammal recording was introduced to the BBS on a trial basis in 1995, to help improve our knowledge of the distribution and population trends of some of our commoner mammals. The focus of the BBS is on birds but we recognise that the collection of information on extra groups can add great value to the scheme as a whole, in addition to providing added interest for participants. The response so far has been very encouraging and mammal recording within the BBS looks set to continue, providing valuable and much needed data which will be evaluated to determine what can be learned from this form of data collection (see Page 12).

Which species do we monitor?

The BBS attempts to monitor as many terrestrial breeding species as possible. Of the 215 or so species which breed regularly in the UK, around 80% are monitored annually through a variety of surveys and over half of these species are covered by the BBS. The other key monitoring schemes are the Heronries Census, the Seabird Monitoring Programme/Seabird Colony Register, the Statutory Conservation Agency/RSPB Annual Breeding Bird Scheme (SCARABBS) and rarer species by the Rare Breeding Birds Panel (RBBP).

SURVEY NEWS

Survey coverage

Following the successes of 1997, our aim in 1998 was to maintain coverage at this level, but concentrate on areas covered less well. After four years of growth and with much of the country reaching optimal coverage, we expected the rate of increase to slow down. Table 1 illustrates this increase since 1994 and shows that the BBS has still attracted over 100 new volunteers during 1998. With a long-term aim for coverage of 2000-3000 squares, we have virtually reached this target with nearly 2300 squares covered in 1998. With this excellent coverage in mind, new squares were issued only when Regional Organisers asked for them or where there had been specific promotion.

England

The well-populated parts of England have been the easiest areas to find volunteers. After five field seasons, many counties have now reached a good level of coverage so perhaps it isn't surprising that the English total has risen by 51 squares compared with last year's incredible 241. So whilst some areas (Cheshire, London, Manchester, Nottingham, Oxfordshire and Worcestershire) are still increasing significantly, many English BTO regions now remain stable. We are of course, collecting a wealth of data enabling us to compile English summaries for many species. We will publish this information alongside the other country-based summaries in future reports.

Northern Ireland

In Northern Ireland, the number of squares covered by volunteers has increased from 38 to 63 (a further 19 are covered by a professional fieldworker in remoter areas). This represents a tremendous increase in volunteer support but we hope that as the BBS gets more widely known, we will be able to encourage even more volunteers. Our Honorary Ireland Officer, Ken Perry, ran another successful training course in 1998 not only encouraging more people to get involved but also providing a useful forum for discussing the finer points of BBS fieldwork. The total number of squares covered in Northern Ireland is now 82. Our aim in future years is to produce a change table for Northern Ireland along the same lines as the Scottish and Welsh tables in this report although for fewer species because the sample size is smaller. Promotion is obviously very important here and following on from our successful County Tyrone workshop last year, we held another in County Armagh in March 1999 to help build up volunteer numbers in the south and west where much of the professional support is needed at present.

Scotland

Although there was a slight fall in the number of squares covered during 1998, there were some very welcome increases in coverage enabling a good selection of common species to be monitored. From 1999 however, there will no longer be any professional fieldworkers funded by the RSPB working in north and west Scotland. For the first five years, around 15% of Scottish squares have been covered by these fieldworkers. During this time, we have been promoting the scheme in remote parts of Scotland in readiness for the end of this support and are hopeful that a good number of these squares will be taken up by volunteers over the next few years. The Scottish summary in last year's report was very well received and will become a regular feature in the BBS Annual Report. We aim to publicise these important data for Scotland widely, to illustrate one of the main strengths of the BBS in providing regional and country-based analyses.

Wales

The coverage in Wales has jumped from 137 to 192 following promotion in 1998. This encouraging increase was followed up by Derek Thomas (Honorary Wales Officer) and the Welsh Regional Network in 1999. Derek put together an article for the Welsh Newsletter of the RSPB, *Y Barcud,* which resulted in over sixty letters from volunteers. In addition, a BBS presentation was given at the Welsh Ornithological Conference. We are hopeful of another substantial increase in Wales this year which will enable us to monitor more species with a high degree of accuracy (see pages 12 & 13 for the first Welsh summary).

SURVEY RESULTS

Species coverage

An impressive total of 215 species was recorded in 1998 (including 10 non-naturalised exotics). The BBS army of fieldworkers found an excellent selection of birds during 1998 and managed to record several unusual species including Purple Heron, Ring-necked Duck, Mediterranean and Iceland Gulls, Firecrest and Marsh Warbler. We are of course concentrating on the commoner species and Tables 2 to 6 detail how successful the survey has been in monitoring them. Eighty-four species and two subspecies were recorded from over 100 squares, up from 76 species in 1994. These are the species we can monitor annually with a high degree of precision. Nineteen further species were recorded from 50-100 squares (including four more promotions from Table 4), which means that the populations of these species can be monitored with a good level of accuracy. Two of these promotions,

Table 1. A breakdown of the BBS squares by country from 1994 to 1998. Note that for 1998 we have shown the numbers of squares issued, surveyed and reported as 'uncoverable' by volunteers. The numbers in parenthesis are the percentages of squares surveyed out of those issued. In many areas, new squares are issued each year and are added to the end of each region's list. These squares will be covered in future years if volunteers are found.

		England	*Scotland*	*Wales*	*N Ireland*	*Channel Is.*	*Isle of Man*	*Total*
1994	Surveyed	1170 (71%)	246 (49%)	123 (64%)	25 (34%)	1 (10%)	4 (67%)	1569 (64%)
1995	Surveyed	1322 (72%)	284 (52%)	123 (59%)	17 (22%)	1 (10%)	4 (57%)	1751 (65%)
1996	Surveyed	1416 (69%)	309 (54%)	118 (54%)	65 (83%)	7 (70%)	4 (40%)	1919 (65%)
1997	Surveyed	1657 (70%)	313 (50%)	137 (49%)	75 (75%)	6 (50%)	6 (55%)	2194 (66%)
1998	**Surveyed**	**1708 (68%)**	**302 (48%)**	**192 (61%)**	**82 (77%)**	**7 (58%)**	**6 (55%)**	**2297 (64%)**
	Issued	2508	629	317	107	12	11	3584
	Uncoverable	97	45	7	1	0	2	152

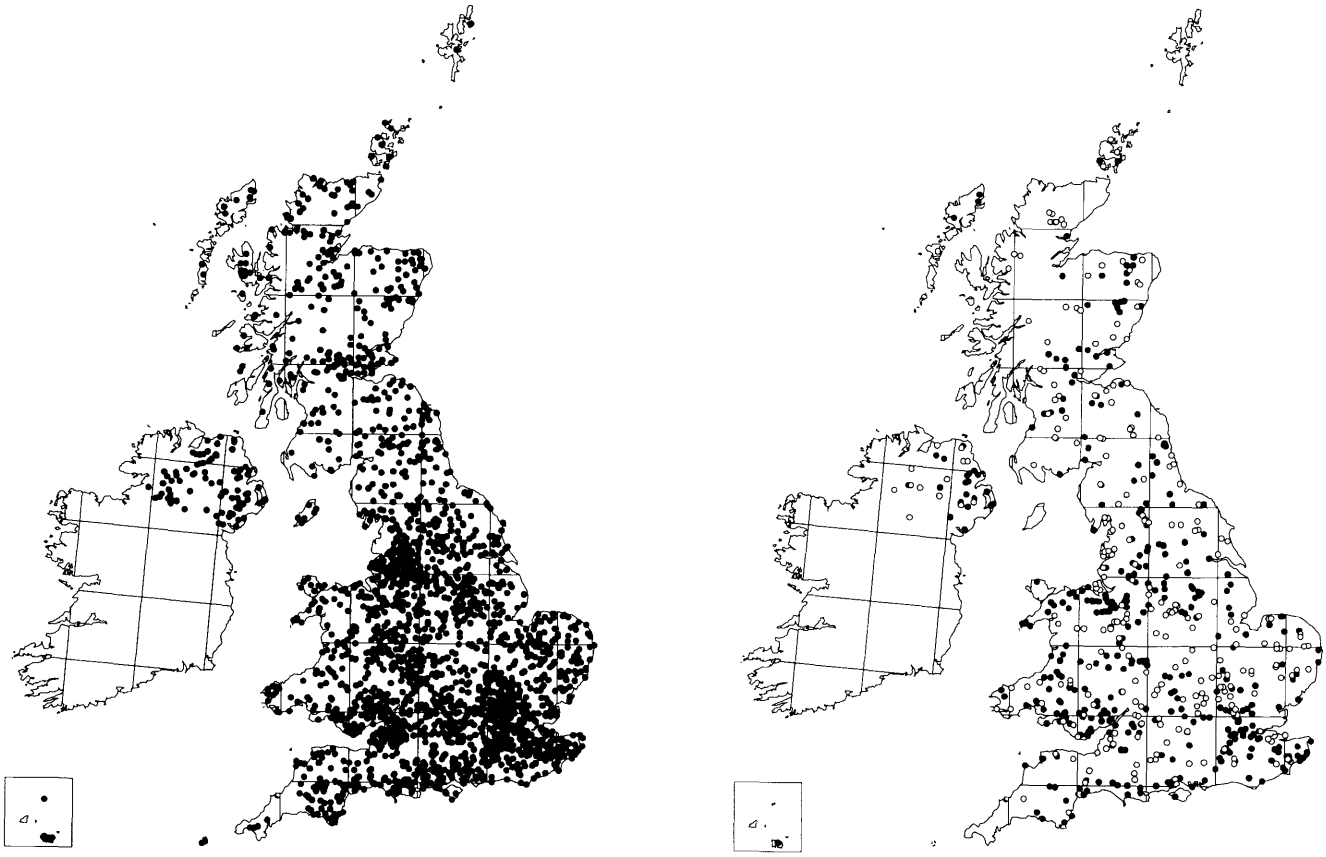


Figure 1. The distribution of BBS plots in 1998. The left-hand map shows the overall coverage in 1998 (2297 squares). The right-hand map shows the gains and losses (closed symbols = squares surveyed for the first time in 1998 and open symbols = squares surveyed in 1997 but not in 1998). The Republic of Ireland is not covered by the BBS but the Countryside Bird Survey (CBS) started in 1998 (see page 14).

Dipper and Pied Flycatcher, probably benefited from the increased coverage in Wales where a good proportion of their populations occur.

It is interesting to look back at the degree of coverage some species were attaining in the first year of the survey, and compare this with the level they now enjoy. Key species like Buzzard (recorded in 286 squares in 1994 and now recorded in 536), Raven (recorded in 120 squares in 1994 and 187 squares in 1998), Grasshopper Warbler (40 squares in 1994 and 88 squares in 1998) and Redpoll (recorded in 90 squares in 1994 and 153 in 1998). Looking through the list of birds recorded, in Tables 2 and 3 we can see that we are gathering good scientific data throughout the country. Some species have a north-westerly distribution such as Wheatear while others such as Turtle Dove are found predominantly in the south-east. As we gather more information each year, we gradually be able to build up population trends and are now in a position to produce graphs of specific species. The species listed in Table 4 are generally scarcer but there is still a wealth of information here. Many species in Table 4 are too scarce to be monitored by the BBS but birds recorded in two or three squares, such as Black-throated Diver or Montagu's Harrier are monitored almost at an individual level because only a few pairs breed each year. Commoner species but with a restricted range include Nightingale and Cetti's Warbler which have both been the subject of specific surveys in recent years. There is still a small group of species for which we know very little. Certain nocturnal species such as Tawny Owl and Woodcock need specially designed surveys to allow us to assess how they are doing. Nevertheless, of all bird surveys across the country, the BBS is the best way to monitor the vast majority of species and an important contribution to our current understanding of ornithology.

Between-year changes

The main aim of the BBS is to monitor changes in bird populations. Table 6 shows the estimated population changes between 1997 and 1998, and for the five-year period from 1994 to 1998. We have concentrated on species recorded from more than 50 squares (i.e. those listed in Tables 2 and 3) since sample sizes allow sufficient precision in the results. A change without a sign is an increase while a negative sign indicates a decrease. Those changes labelled with an asterisk are statistically significant and we can therefore be confident that a real change in population level has occurred. It is important to emphasise that it is the longer-term trend which is of greater interest; the between-year changes are bound to fluctuate for some species, often driven by the weather.

Since the BBS will ultimately take over the monitoring role of the CBC, it is vital that we understand how the results from the two schemes interrelate. Although we have yet to carry out a comparison with sufficient years of overlap, there is good evidence of agreement between the two schemes. For example, both schemes showed that Wren and Robin numbers dropped between 1996 and 1997, but increased significantly again in 1998. Future analytical work will focus on methods of relating the results of these two surveys.

Overall trends

Population changes between 1997 and 1998, and between 1994 and 1998 are presented for 101 species in Table 6, and discussed in the following taxonomic sections. The 1997-98 change reflects mainly differences in environmental conditions since the last count, whereas the 1994-98 change provides a better indication of medium-term change. For the first time, we present plots of the annual population indices for a selection of species (see page 11). Note that all indices are relative to the index of 1.0 set in 1994, the first year of the BBS.

Among the 101 species we are able to index using BBS, 32 have increased and 21 have decreased significantly between 1994 and 1998. Ten of the species monitored by BBS were identified as of high conservation concern in a recent review of conservation priorities; half of them (Corn Bunting, Skylark, Spotted Flycatcher, Linnet and Bullfinch) continue to show significant declines since 1994. The BBS suggests that populations of the Grey Partridge, Song Thrush, Turtle Dove, Reed Bunting and Tree Sparrow are currently stable, although the declining trend for the latter three species may eventually prove significant.

Table 2. Species recorded by the BBS in 1997-98 in 100 or more squares in each year. For each year the figures on the left are the number of squares a species was recorded from (n) and the figures on the right the percentage of squares with that species (%). Species in parenthesis are usually recognised as races or forms rather than full species.

Species[1]	1997		1998		Species	1997		1998	
	n	%	n	%		n	%	n	%
Cormorant	132	6	164	7	*Dunnock*	1543	70	1654	72
Grey Heron	493	22	496	22	Robin	1831	83	1913	84
Mute Swan	172	8	191	8	*Redstart*	151	7	156	7
Canada Goose	298	14	322	14	Wheatear	252	11	262	11
Shelduck	127	6	133	6	*Blackbird*	1925	88	2024	89
Mallard	950	43	1028	45	**Song Thrush**	1405	64	1539	67
Tufted Duck	128	6	133	6	Mistle Thrush	957	44	1085	47
Sparrowhawk	276	13	324	14	Sedge Warbler	273	12	257	11
Buzzard	463	21	546	24	Lesser Whitethroat	157	7	208	9
Kestrel	563	26	594	26	Whitethroat	1079	49	1097	48
Red Grouse	117	5	125	5	Garden Warbler	410	19	438	19
Red-legged Partridge	418	19	428	19	Blackcap	1057	48	1234	54
Grey Partridge	294	13	237	10	Chiffchaff	987	45	1173	51
Pheasant	1320	60	1384	61	Willow Warbler	1334	61	1372	60
Moorhen	488	22	553	24	Goldcrest	527	24	572	25
Coot	182	8	229	10	**Spotted Flycatcher**	215	10	226	10
Oystercatcher	255	12	255	11	Long-tailed Tit	609	28	669	29
Lapwing	563	26	545	24	*Marsh Tit*	143	7	117	5
Snipe	133	6	112	5	Coal Tit	564	26	601	26
Curlew	460	21	467	20	Blue Tit	1839	84	1901	83
Black-headed Gull	481	22	471	21	Great Tit	1628	74	1744	76
Common Gull	136	6	128	6	Nuthatch	302	14	332	15
Lr Black-backed Gull	454	21	486	21	Treecreeper	292	13	266	12
Herring Gull	494	22	561	25	Jay	540	25	558	24
Gt Black-backed Gull	100	5	112	5	Magpie	1480	67	1599	70
(Feral Pigeon)	583	27	646	28	Jackdaw	1282	58	1325	58
Stock Dove	588	27	638	28	Rook	1107	50	1143	50
Wood Pigeon	1956	89	2056	90	(Carrion Crow)	1827	83	1926	84
Collared Dove	1063	48	1104	48	(Hooded Crow)	129	6	122	5
Turtle Dove	201	9	235	10	Raven	161	7	187	8
Cuckoo	820	37	792	35	*Starling*	1562	71	1633	71
Swift	832	38	965	42	House Sparrow	1318	60	1383	60
Green Woodpecker	536	24	661	29	**Tree Sparrow**	149	7	128	6
Gt Spotted Woodpecker	598	27	667	29	Chaffinch	1929	88	2042	89
Skylark	1517	69	1551	68	Greenfinch	1394	63	1434	63
Swallow	1532	70	1579	69	*Goldfinch*	1075	49	1100	48
House Martin	751	34	767	34	Siskin	133	6	139	6
Tree Pipit	119	5	134	6	**Linnet**	1115	51	1103	48
Meadow Pipit	669	30	687	30	Redpoll	133	6	153	7
Yellow Wagtail	170	8	149	7	**Bullfinch**	535	24	453	20
Grey Wagtail	124	6	147	6	Yellowhammer	1124	51	1101	48
Pied Wagtail	957	44	1063	46	**Reed Bunting**	342	16	340	15
Wren	1836	84	1998	87	**Corn Bunting**	171	8	137	6

Table 3. Species recorded by the BBS in 1997-98 in 51-100 squares in at least one of the years. For details see Table 2.

Species[1]	1997		1998		Species	1997		1998	
	n	%	n	%		n	%	n	%
Little Grebe	50	2	50	2	Dipper	43	2	60	3
Gt Crested Grebe	57	3	67	3	Whinchat	88	4	95	4
Greylag Goose	85	4	98	4	*Stonechat*	50	2	83	4
Golden Plover	99	5	89	4	*Grasshopper Warbler*	76	3	88	4
Redshank	60	3	67	3	Reed Warbler	86	4	107	5
Common Sandpiper	80	4	74	3	Wood Warbler	67	3	70	3
Common Tern	45	2	57	2	Pied Flycatcher	48	2	50	2
Little Owl	116	5	79	3	*Willow Tit*	63	3	62	3
Tawny Owl	80	4	93	4	Common Crossbill	62	3	48	3
Sand Martin	99	5	93	4					

[1] Species in bold are red listed in *Birds of Conservation Concern* or within Tables 1-3 on the list of *Birds of Conservation Importance*. Species in italics are listed as amber in *Birds of Conservation Concern* or within Table 4 on the list of *Birds of Conservation Importance*.

Table 4. Species recorded by the BBS in 1997-98 in 1-50 squares in each year. The table shows the number of squares occupied in each year. Annual monitoring of these rarer species within the BBS will be limited. Species in parenthesis are usually recognised as races or forms rather than full species.

Species	*1997*	*1998*	*Species*	*1997*	*1998*	*Species*	*1997*	*1998*
Red-throated Diver	17	15	Montagu's Harrier	1	1	Black Tern	0	3
Black-throated Diver	4	4	Goshawk	11	9	Guillemot	0	3
Great Northern Diver	1	1	Golden Eagle	7	2	Razorbill	0	3
Black-necked Grebe	2	0	Osprey	4	5	Black Guillemot	2	2
Fulmar	21	25	Merlin	23	23	(Rock Dove)	9	8
Manx Shearwater	0	1	Hobby	29	29	Ring-necked Parakeet	7	8
Gannet	5	5	Peregrine	26	34	Barn Owl	13	19
Shag	7	8	Ptarmigan	2	3	Long-eared Owl	3	2
Little Egret	1	2	Black Grouse	14	9	Short-eared Owl	18	18
Purple Heron	0	1	Capercaillie	1	1	Nightjar	1	1
Whooper Swan	0	3	Quail	28	28	Kingfisher	48	45
Pink-footed Goose	7	4	Golden Pheasant	4	1	Lr Spotted Woodpecker	18	27
White-fronted Goose	1	1	Water Rail	3	2	Woodlark	10	27
Snow Goose	1	2	Corncrake	3	3	Rock Pipit	11	20
Barnacle Goose	6	5	Avocet	4	4	Nightingale	32	33
Brent Goose	1	2	Stone Curlew	4	5	Black Redstart	1	3
Egyptian Goose	4	7	Little Ringed Plover	13	10	Ring Ouzel	16	29
Mandarin	10	8	Ringed Plover	23	22	Fieldfare	30	35
Wigeon	10	4	Dotterel	2	1	Redwing	7	4
Gadwall	19	31	Grey Plover	3	2	Cetti's Warbler	4	5
Teal	19	20	Sanderling	2	1	Marsh Warbler	1	2
Pintail	2	1	Dunlin	30	28	Dartford Warbler	2	6
Garganey	0	1	Jack Snipe	0	1	Firecrest	0	1
Shoveler	9	12	Woodcock	5	3	Bearded Tit	2	1
Red-crested Pochard	1	1	Black-tailed Godwit	2	1	Crested Tit	2	1
Ring-necked Duck	0	1	Bar-tailed Godwit	0	2	Short-toed Treecreeper	3	2
Pochard	18	12	Whimbrel	23	19	Golden Oriole	1	0
Scaup	1	1	Greenshank	19	13	Red-backed Shrike	2	2
Eider	8	4	Green Sandpiper	4	4	Woodchat Shrike	1	0
Common Scoter	1	1	Turnstone	4	4	Chough	6	6
Goldeneye	2	3	Arctic Skua	7	6	Brambling	7	9
Red-breasted Merganser	11	14	Great Skua	7	4	Twite	27	20
Goosander	32	46	Mediterranean Gull	0	1	Scottish Crossbill	5	2
Ruddy Duck	6	10	Iceland Gull	0	1	Hawfinch	3	0
Honey Buzzard	0	1	Kittiwake	1	2	Cirl Bunting	3	3
Red Kite	13	14	Sandwich Tern	6	9			
White-tailed Eagle	1	1	Roseate Tern	0	2			
Marsh Harrier	7	13	Arctic Tern	9	3			
Hen Harrier	16	14	Little Tern	1	3			

Although recorded in only 50 squares across the UK, the increased coverage in Wales may allow us to gain a fair understanding of Pied Flycatcher population changes. (Artwork by Maxine Grover)

Table 5. Feral or non-native species on category E of the official BOU British list recorded by the BBS during 1997-98. The table shows the number of squares occupied in each year.

Species	*1997*	*1998*
Peacock	11	8
Black Swan	2	3
Reeves's Pheasant	1	2
(Feral Goose)	1	2
Ruddy Shelduck	0	2
Harris Hawk	1	1
Wood Duck	1	1
Feral Guineafowl sp.	1	1
Ne-ne	0	1
Falcated Duck	0	1
(Feral Aylesbury Duck)	2	0
Muscovy Duck	1	0

How the percentage changes are calculated

Population changes were assessed using a loglinear model with Poisson error terms. We used the higher count from the early or late visit for each species on each square as our best estimate of the abundance of that species. Counts were modelled as a function of square and year effects, with counts weighted to account for the under- or over-sampling of BBS regions within the UK. Indices for Waders were corrected by excluding large flocks and in the case of Golden Plovers, by also excluding non-upland squares. Correction for under- or over-dispersion of the count data was also incorporated. Any square with two annual counts between 1994 and 1998 was included in the analysis. Note that missing data for particular years are imputed using these methods.

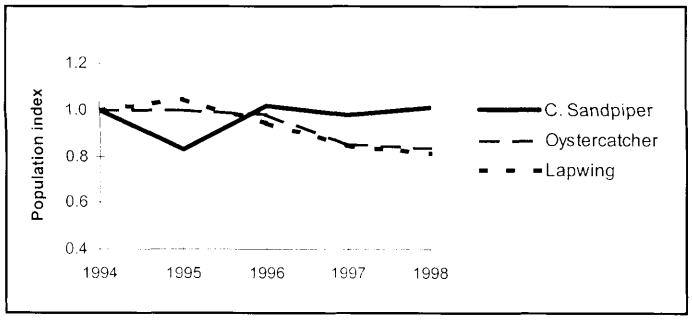
Table 6. Population changes of widespread species 1997-98 and 1994-98. The sample size is the average number of squares occupied each year over the 5-year period under consideration. The figures presented are percentage changes in population levels for the respective time periods; those marked with an asterisk are statistically significant at the 5% level. For the 1994-98 period, the lower (lcl) and upper (ucl) 95% confidence limits are given. See above for further details. As for Table 2, species in bold are red listed in *Birds of Conservation Concern* or within Tables 1-3 on the list of *Birds of Conservation Importance.* Species in italics are listed as amber in *Birds of Conservation Concern* or are within Table 4 of *Birds of Conservation Importance.*

Species	Sample	Change 97-98	Change 94-98	lcl	ucl
Great Crested Grebe	51	14	15	-16	58
Cormorant	115	19	18	-6	48
Grey Heron	407	-8	-2	-14	11
Mute Swan	146	19	14	-5	36
Greylag Goose	73	1	31	-9	88
Canada Goose	249	-5	25 *	6	46
Shelduck	105	-1	-35 *	-47	-21
Mallard	814	2	5	-2	13
Tufted Duck	109	-4	10	-12	37
Sparrowhawk	243	12	3	-13	22
Buzzard	373	1	22 *	8	37
Kestrel	482	1	-18 *	-27	-8
Red Grouse	98	14	28 *	4	58
Red-legged Partridge	346	-7	19 *	6	35
Grey Partridge	227	-15	0	-16	18
Pheasant	1108	1	0	-5	5
Moorhen	444	9	-1	-11	10
Coot	163	3	16	-1	37
Oystercatcher	215	-1	-16 *	-24	-6
Golden Plover	79	2	0	-20	25
Lapwing	507	-4	-18 *	-25	-10
Snipe	115	-1	10	-11	37
Curlew	399	-1	-12 *	-19	-4
Redshank	61	77 *	21	-6	57
Common Sandpiper	63	3	1	-21	30
Black-headed Gull	411	-16	-27 *	-36	-18
Common Gull	121	-18	16	-5	42
Lesser Black-backed Gull	371	-8	39 *	22	59
Herring Gull	400	3	33 *	18	49
Great Black-backed Gull	82	-27	7	-18	39
Feral Pigeon	485	17	15 *	4	27
Stock Dove	530	5	15 *	3	27
Wood Pigeon	1652	6	0	-4	4
Collared Dove	884	6	16 *	9	23
Turtle Dove	182	7	-9	-24	9
Cuckoo	727	-4	-15 *	-22	-7
Little Owl	80	-31	-21	-42	8
Tawny Owl	68	11	-13	-37	21
Swift	780	9	-13 *	-31	-6
Green Woodpecker	464	19	17 *	5	30
Great Sp. Woodpecker	500	10	36 *	22	52
Skylark	1300	1	-5 *	-8	-1
Sand Martin	85	-40	-21	-41	6
Swallow	1266	-7	2	-3	8
House Martin	645	-7	-2	-11	7
Tree Pipit	112	46	36 *	11	66
Meadow Pipit	584	12 *	4	-1	9
Yellow Wagtail	155	-30 *	-11	-26	7
Grey Wagtail	124	33	-18	-35	5
Pied Wagtail	848	3	13 *	5	23
Wren	1598	26 *	3	-1	6
Dunnock	1325	8	2	-3	7
Robin	1543	17 *	5 *	1	8
Redstart	121	-10	42 *	16	73
Whinchat	82	7	18	-7	50
Stonechat	55	77	37	-3	95
Wheatear	225	11	45 *	26	66
Blackbird	1623	9 *	3	0	6
Song Thrush	1234	18 *	-1	-6	5
Mistle Thrush	845	10	-6	-14	2
Grasshopper Warbler	58	-14	101 *	40	188
Sedge Warbler	217	-10	-7	-19	7
Reed Warbler	76	13	30 *	5	61
Lesser Whitethroat	190	24	-36 *	-47	-23
Whitethroat	885	-7	14 *	7	22
Garden Warbler	341	-18	2	-11	16
Blackcap	891	18 *	42 *	33	51
Wood Warbler	58	-37	-43 *	-58	-22
Chiffchaff	832	14	32 *	24	41
Willow Warbler	1142	9	25 *	20	31
Goldcrest	451	4	42 *	29	56
Spotted Flycatcher	187	-9	-23 *	-36	-7
Pied Flycatcher	39	-11	-7	-34	30
Long-tailed Tit	547	-13	-10	-20	1
Marsh Tit	110	-7	15	-12	48
Willow Tit	59	-19	-30	-51	0
Coal Tit	481	-8	22 *	11	34
Blue Tit	1518	-11 *	7 *	3	11
Great Tit	1370	2	14 *	9	20
Treecreeper	241	-12	17	-1	39
Nuthatch	253	-8	30 *	12	50
Jay	452	-1	-17 *	-26	-7
Magpie	1250	-3	2	-2	7
Jackdaw	1047	3	13 *	6	20
Rook	927	8	10 *	1	20
Carrion Crow	1547	-1	7 *	2	12
Raven	139	21	37 *	9	71
Starling	1345	-12 *	-13 *	-18	-7
House Sparrow	1122	-4	-7 *	-11	-3
Tree Sparrow	127	-8	-8	-27	5
Chaffinch	1635	5	4 *	1	8
Greenfinch	1151	-4	13 *	7	20
Goldfinch	911	-10	-9 *	-16	-2
Siskin	112	-32	12	-12	42
Linnet	936	-9	-10 *	-17	-3
Redpoll	115	-23	14	-10	45
Common Crossbill	40	-28	-34	-56	0
Bullfinch	421	-25 *	-27 *	-36	-16
Yellowhammer	944	-6	-16 *	-21	-12
Reed Bunting	305	-4	-11	-21	1
Corn Bunting	145	-28	-42 *	-51	-31

Grebes to Gulls

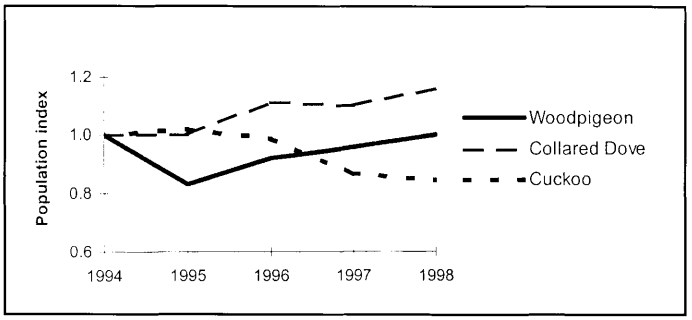
Many of the population trends for this group are not significant, reflecting the fact that the BBS is probably not the most appropriate monitoring technique for colonially breeding species or those that congregate in particular habitats. Most waterfowl populations appear to be stable and Canada Geese are increasing significantly, but Shelduck continue to decline and the longer-term downward trend is now significant. Sparrowhawks have increased for the second year in a row, and the five-year trend suggests population stability. Buzzards are also doing well, with a significant increase in numbers over the five-year period whereas Kestrels, a typical farmland species, have experienced a significant decline. Red Grouse and Red-legged Partridge have increased significantly over the past five years, and populations of the red-listed Grey Partridge and of Pheasant appear to be stable.

Coot and Moorhen populations are healthy, but three species of waders (Oystercatcher, Lapwing and Curlew) show evidence of significant declines since 1994. Numbers of Snipe, Redshank, Golden Plover and Common Sandpiper appear to be stable, and there were no significant changes in counts of any species between 1997 and 1998. It should be noted that indices for waders have been retrospectively adjusted to correct for inflated counts of flocks of what were probably non-breeders, as described further in the section on 'Improvements in the Calculation of Population Indices' (see page 14). Counts of most gulls were lower this year than last year, but not significantly. Over the five-year period, Black-headed Gulls have experienced a significant decline, whereas the other four species are increasing, Lesser Black-backed and Herring Gulls significantly.



Pigeons to Woodpeckers

Swifts have increased slightly since last year, but there is a significant downward trend over the past five years. Cuckoo counts were slightly less than the year before, and also exhibit a significant downward trend. Little and Tawny Owls declined over the five year period but not significantly. However, Green and Great Spotted Woodpeckers are both doing well, with significant population increases since 1994. None of the doves or pigeons have increased significantly since the previous year's counts, but Feral Pigeon, Stock Dove and Collared Dove show significant increases since 1994. Wood Pigeon population seems stable and numbers of the red-listed Turtle Dove appear to have increased since last year.

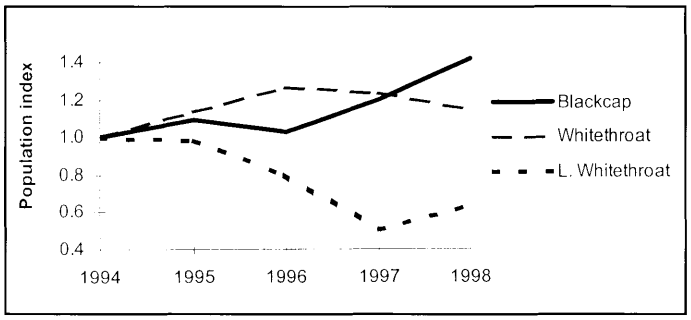


Larks to Thrushes

Populations of Wren, Dunnock, Meadow and Tree Pipits and all three widespread wagtail species appear to be healthy, with significant increases in numbers of Pied Wagtail and Tree Pipit since 1994. Blackbird and Song Thrush numbers are up significantly from 1997, and despite an overall declining trend for Mistle Thrush, populations of all three large thrushes appear stable over the past five years, perhaps due to the milder winters. Of the smaller thrushes, only Robins have increased significantly since last year (also revealed by CBC), but Redstart, Wheatear and Robin have increased significantly since 1994.

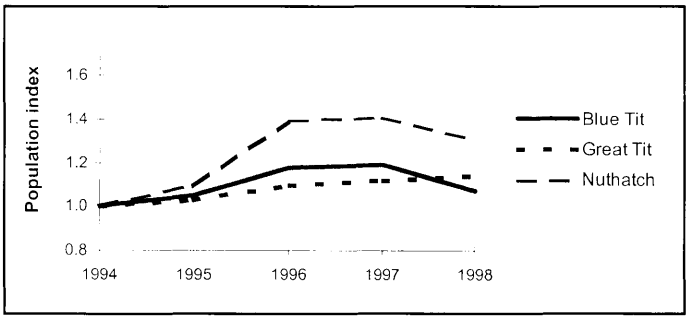
Warblers to Flycatchers

Counts of five warbler species were lower and counts of six species higher, Blackcap significantly, than last year. The reduction in numbers of Whitethroat and Sedge Warbler, and significant increases in Blackcap and Chiffchaff since last season are mirrored by the CBC, but the trends for Willow and Garden Warbler do not correspond as well. According to the BBS data, two species (Lesser Whitethroat and Wood Warbler) have experienced significant longer-term declines since 1994, whereas Blackcap, Whitethroat, Reed Warbler, Grasshopper Warbler, Chiffchaff, Willow Warbler and Goldcrest show significant population increases, and Garden and Sedge Warbler numbers are stable. The Spotted Flycatcher has declined for the fourth year in a row, and numbers are significantly lower than in 1994. For the first time we also compare annual population indices for Pied Flycatcher, revealing a non-significant declining trend.



Tits to Starlings

Although Blue Tit numbers were significantly lower than in 1997, Blue, Great and Coal Tits have all increased significantly since 1994. The other three tit species occurred in lower numbers than in 1997, but populations show no longer-term trend. Nuthatch and Treecreeper counts declined from last year, but numbers of both species have increased since 1994, Nuthatches significantly so. None of the population indices for corvids have changed significantly since 1997 but, since 1994, four species have increased significantly and Jays have experienced a significant decline. Magpie populations appear to be stable. Starlings declined again this year and are now significantly lower than in 1994. According to the CBC, this amber-listed species is experiencing a long-term decline, particularly in woodlands.



Sparrows to Buntings

House Sparrows continue to decline and numbers are now significantly lower than in 1994. Tree Sparrow numbers are also down from last year, in agreement with a significant decline found by the CBC, but are not significantly lower than in 1994. Chaffinch and Greenfinch show evidence of population increases, and although numbers of Siskin and Redpoll have fluctuated considerably over the last five years, populations appear to be healthy. In contrast, Goldfinch, Linnet and Bullfinch numbers continue to decline, with all three species significantly less abundant than in 1994. Reed Bunting, Corn Bunting and Yellowhammer populations are lower than last year and the latter two species have declined significantly since 1994. Five of the species in this group are red-listed and future surveys are being initiated to identify the causes of declines in seed-eating farmland birds such as Linnet, Bullfinch, Corn Bunting, Yellowhammer and Tree Sparrow.

Mammals

An excellent 85% of all BBS returns were supplied with a mammal form, proving that this part of the survey is both easy and popular. Of these, 10% were 'nil' returns which are equally important to the analyses. This part of the survey has been met with a great deal of interest from the Mammal Society and the JNCC. We are now looking into the data collected over the last four years (see page 14).

The mammals recorded during 1998 included Common Seal and Long-eared Bat from one square each. The common mammals are recorded in Table 7 below. As in previous years, Rabbit is by far the most widespread, but Grey Squirrel was recorded in more squares than Brown Hare for the first time. Mole has moved into fifth place, recorded in 20% of squares. Obviously, observers are recording presence of mole hills rather than actually seeing the animals but, even recording signs of particular species, useful distribution information can be collected.

Table 7. Mammals recorded by the BBS during 1998. The table shows the number (n) and percentage (%) of squares occupied for the 15 most widespread mammals.

Mammal	*n*	%
Rabbit	1364	70
Grey Squirrel	673	35
Brown Hare	642	33
Red Fox	598	31
Mole	391	20
Roe Deer	361	19
Badger	243	13
Hedgehog	239	12
Common Shrew	164	8
Brown Rat	135	7
Stoat	128	7
Red Deer	113	6
Weasel	110	6
Muntjac Deer	108	6
Fallow Deer	95	5

BBS and habitats

Habitat change over time has a significant impact on bird populations and so recording the habitats available to birds is vital if your BBS data are to be of maximum use for conservation. These data allow us to look at habitat preferences of birds, population trends within habitats, and large-scale changes in land use, all of utmost importance in identifying underlying causes of population changes that could lead to specific conservation recommendations. Habitat preferences can then be modelled to identify the key attributes required by a species and to predict how numbers might change under different scenarios, such as changes in agricultural policy. The key features of the current coding system are that the fieldworker is assumed to be in the best position to describe the dominant features, and that the codes reflect habitat structure without requiring botanical expertise.

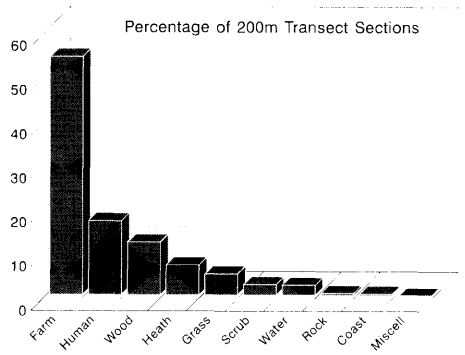


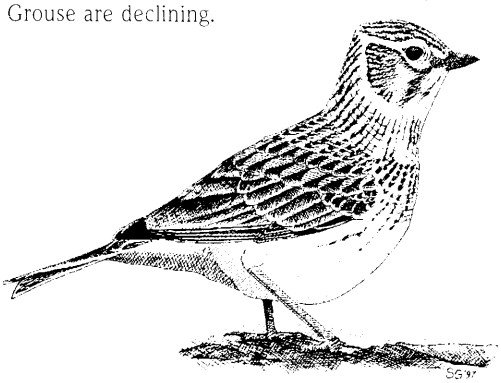
Figure 2. Overall habitat coverage of the BBS in 1998. The histogram shows the percentage of 200m transect sections surveyed in 1998 falling into the broad habitat categories. Unlike bird population changes, these figures have not been corrected for the distribution of BBS squares, and so do not represent the proportions of these habitats in the UK as a whole. Farmland is dominant at 54%, followed by 17% human, 12% woodland and 12% heath or grassland habitats.

The value of BBS habitat data has been demonstrated in a number of studies. It was used to show how habitat preferences of Skylarks vary across the UK and the types of crops and crop management that would best provide these habitats. Investigations of declining species revealed that although farmland is very important to Skylark, Dunnock, Blackbird, Song Thrush, Linnet, Reed Bunting and Bullfinch, human, woodland and scrub habitats sustain a significant proportion of their populations. The Starling is found mainly in human habitats. Comparison of habitat use and population trends of sparrows, finches and buntings showed that farmland specialists such as Tree Sparrow, Yellowhammer and Corn Bunting are experiencing the steepest declines. Further studies are being planned to pinpoint the causes.

COUNTRY SUMMARIES

Scotland

Of the 60 Scottish species that occurred in at least 20 squares, numbers of two species (Wren and Robin) were significantly up from last year and one species (Blue Tit) significantly lower (see Table 8). Over the medium term, 19 species show evidence of significant increases since 1994, the significant increases in Starling, Linnet and Bullfinch standing in contrast to their significant overall declines in the UK as a whole. It is probably too early to make much of these trends, but it is interesting that a higher proportion of species appear to be increasing in Scotland than in the UK as a whole. One possibility is that climate change has resulted in range expansion northward, particularly of species near the northern edge of their range. Five species show evidence of significant declines in Scotland since 1994. The declines in Oystercatcher and Lapwing are in keeping with their overall declines across the UK but Black-headed Gull, Pheasant and Wood Pigeon are widespread species that are stable elsewhere. Trends in gull numbers may be complicated by movements between colonies and in Pheasants by artificial stocking. The reason for the decline in Wood Pigeons is unknown; they may be suffering from reductions in fallow land. In contrast to the findings of some other studies, there is no evidence from BBS in Scotland that upland species such as Skylark, Meadow Pipit or Red Grouse are declining.



It will be interesting to see how the trend for Skylark develops. This species appears not to be in decline in Scotland but is declining significantly in the UK as a whole. (Artwork by Simon Gillings)

Wales

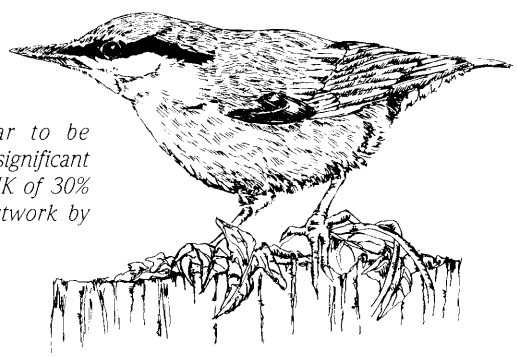
This year, the number of squares covered in Wales rose to 192, allowing us to calculate population indices for 53 fairly widespread species that occurred in at least 20 squares. Among these 53 species (listed in Table 9), an increase in the counts of Wren is the only significant change since last year. Between 1994 and 1998, four species (Mallard, Starling, Chaffinch and Bullfinch) exhibit significant declines and six species (Swallow, House Martin, Blackcap, Chiffchaff, Nuthatch and House Sparrow) significant increases. The declines in Starling and Bullfinch numbers reflect the overall UK declines, but the increase in House Sparrows is in opposition to the main UK trend, the reason for which is not clear. Of species with population strongholds in Wales, Redstart, Wheatear and Raven numbers are stable and Nuthatch has increased since 1994. There are too few Welsh squares occupied to identify trends in oakwood specialists such as Wood Warbler and Pied Flycatcher or upland species such as Stonechat and Whinchat.

Table 8: Population changes of widespread species in **Scotland** 1997-98 and 1994-98. Species marked with an asterisk show statistically significant changes in counts over the period indicated. We report population changes for all species recorded in at least 20 squares per year, on average. However, it should be noted that figures for species recorded in less than 100 squares often have large confidence limits and hence the reported changes should be treated as preliminary estimates. Bold and italics denote conservation status as in Table 6.

Species	*Sample*	*Change 97-98*	*Change 94-98*		*lcl*	*ucl*
Grey Heron	37	-17	61	*	2	154
Mallard	79	5	14		-11	47
Buzzard	84	-22	12		-15	49
Kestrel	44	44	-15		-41	23
Red Grouse	60	33	44	*	7	93
Grey Partridge	26	8	67		-2	183
Pheasant	95	-3	-22	*	-36	-3
Oystercatcher	113	5	-18	*	-29	-5
Golden Plover	51	7	4		-22	37
Lapwing	83	-6	-28	*	-41	-13
Snipe	55	22	32		-5	83
Curlew	124	8	-10		-24	6
Redshank	21	-14	-19		-45	20
Common Sandpiper	38	6	2		-26	42
Black-headed Gull	74	-24	-58	*	-68	-44
Common Gull	70	-14	0		-23	29
Lesser Black-backed Gull	56	-32	38		0	88
Herring Gull	95	-1	30		0	69
Feral Pigeon	47	32	29		-10	84
Wood Pigeon	149	-4	-21	*	-32	-8
Collared Dove	33	46	0		-33	49
Cuckoo	69	1	13		-18	56
Swift	36	44	-28		-51	6
Skylark	195	-6	4		-7	16
Swallow	122	34	1		-16	23
House Martin	35	-15	111	*	28	248
Tree Pipit	27	10	51	*	1	126
Meadow Pipit	206	11	7		-3	17
Grey Wagtail	22	114	-29		-63	35
Pied Wagtail	113	39	46	*	20	79
Wren	170	75	84	*	60	112
Dunnock	90	23	33	*	4	69
Robin	146	47	22	*	5	41
Wheatear	78	11	65	*	31	108
Blackbird	135	21	-3		-15	11
Song Thrush	123	34	17		-4	43
Mistle Thrush	56	48	28		-11	84
Sedge Warbler	45	-16	-4		-30	30
Whitethroat	50	21	25		-15	82
Blackcap	22	31	83	*	15	190
Willow Warbler	176	11	65	*	44	89
Goldcrest	70	17	91	*	47	148
Coal Tit	98	-8	36	*	10	68
Blue Tit	111	-37	-16		-33	6
Great Tit	96	-2	33	*	4	69
Magpie	29	-5	47		-1	118
Jackdaw	84	6	15		-7	44
Rook	95	69	65	*	23	121
Carrion Crow	143	-10	-4		-20	15
Raven	40	48	42		-9	122
Starling	111	52	49	*	9	104
House Sparrow	68	6	-3		-21	20
Chaffinch	190	9	21	*	9	33
Greenfinch	73	-8	12		-14	47
Goldfinch	51	-28	6		-28	56
Siskin	61	-24	3		-28	49
Linnet	72	18	60	*	22	110
Bullfinch	28	76	202	*	59	472
Yellowhammer	82	-2	-7		-24	13
Reed Bunting	38	27	17		-21	74

Table 9: Population changes of widespread species in **Wales** 1997-98 and 1994-98. Species marked with an asterisk show statistically significant changes in counts over the period indicated. We report population changes for all species recorded in at least 20 squares, but estimates for species recorded in less than 100 squares should be considered preliminary. Bold and italics denote conservation status as in Table 6.

Species	*Sample*	*Change 97-98*	*Change 94-98*		*lcl*	*ucl*
Grey Heron	28	6	3		-36	64
Mallard	39	-22	-38	*	-56	-11
Buzzard	80	-3	-11		-30	14
Pheasant	53	5	-13		-32	12
Curlew	31	26	2		-29	48
Lesser Black-backed Gull	33	-14	34		-19	122
Herring Gull	38	-4	25		-13	80
Stock Dove	21	19	57		-16	194
Wood Pigeon	112	10	13		-1	29
Collared Dove	38	8	9		-23	54
Cuckoo	48	26	10		-22	53
Swift	40	47	4		-30	56
Green Woodpecker	32	26	43		-9	123
Gt Spotted Woodpecker	34	9	20		-22	85
Skylark	69	11	9		-8	29
Swallow	101	12	48	*	22	79
House Martin	58	29	63	*	20	120
Meadow Pipit	54	1	12		-5	31
Pied Wagtail	71	-30	-7		-28	20
Wren	115	32	3	*	-8	16
Dunnock	87	-5	10		-10	35
Robin	114	16	-6		-17	6
Redstart	45	15	16		-11	52
Wheatear	31	-11	-2		-35	46
Blackbird	113	12	9		-3	22
Song Thrush	95	21	5		-12	25
Mistle Thrush	60	31	0		-26	36
Whitethroat	49	-32	13		-13	48
Garden Warbler	44	-42	-26		-46	1
Blackcap	65	0	50	*	17	91
Chiffchaff	77	2	38	*	14	67
Willow Warbler	108	-2	-5		-15	8
Goldcrest	53	-15	5		-16	32
Long-tailed Tit	38	32	52		-8	151
Coal Tit	45	-22	-3		-29	32
Blue Tit	106	-13	12		-3	30
Great Tit	99	-15	11		-8	35
Nuthatch	43	-6	66	*	15	139
Treecreeper	29	-21	54		-6	152
Jay	42	12	3		-29	50
Magpie	102	9	17		-1	37
Jackdaw	82	13	21		-3	49
Rook	51	5	-7		-39	41
Carrion Crow	119	-1	16		-1	36
Raven	50	29	22		-13	70
Starling	62	-19	-38	*	-55	-15
House Sparrow	69	11	55	*	24	94
Chaffinch	118	-10	-16	*	-25	-5
Greenfinch	59	-8	30		0	68
Goldfinch	68	-16	3		-23	37
Linnet	61	-37	-3		-28	30
Bullfinch	41	-20	-45	*	-63	-17
Yellowhammer	34	-10	-27		-50	6



Nuthatch appear to be doing well with a significant increase in the UK of 30% since 1994. (Artwork by Maxine Grover)

BBS RESEARCH

Differences between actual and ideal habitat

BBS observers will be familiar with recording habitat codes for both the ideal transect of two parallel lines and the actual transect walked. To assess potential bias caused by these unavoidable deviations, we looked for differences in habitat between actual and ideal transects (see Field & Gregory 1998). The majority of observers consistently provide this information and we found that, overall, about 40% of transects deviate from the ideal by a mean distance of about 110m. However, broad habitat differences occurred in only a small percentage (about 11%) of deviations, and these are mainly away from farmland and coastal habitats, and towards woodland and freshwater habitats. There was also a tendency for observers in urban habitats to move closer to roads. Because these deviations were consistent over the four years of these comparisons, population change indices should not be affected. However, these biases could influence estimates of bird abundance where random habitat sampling is essential. Further investigations are planned to assess bias toward smaller-scale habitat features such as boundaries (as you might have noticed from some minor changes to the 1999 habitat recording forms) and to determine the reason for route changes. We are therefore asking observers to continue recording ideal as well as actual habitats on their transects.

Improvements in the calculation of population indices

The success of the BBS is due to enormous input from volunteers. If the derived indices are to reflect real population trends, the analytical methods we use must be appropriate and effective in detecting changes. Data from 1994 to 1997 were recently re-analysed, to investigate the effects of potential biases due to differences in the timing of visits, weather conditions, or the presence of large flocks of non-breeders in some species (see Field & Gregory 1999).

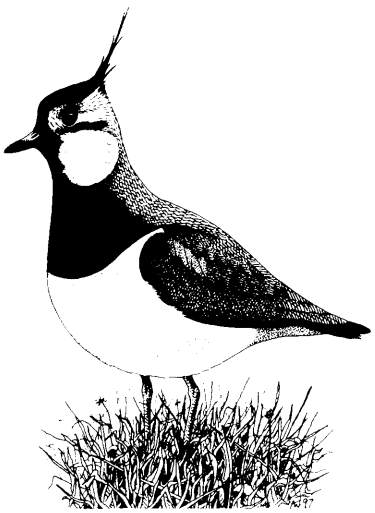
BBS observers are asked to make two bird recording visits to their squares, with at least a four-week interval between them. Most counts are made during the recommended period from April to June and the average time between counts is 41 days. We compared data from both counts for evidence of seasonal changes in abundance. About half (52) of the 100 commonest species showed no significant variation in counts between early and late visits in any year. Thirty-two species showed seasonal differences in at least two years. Of 18 species that were recorded in higher numbers on the early count, all except Blackcap, Chiffchaff and Willow Warbler are residents. Chiffchaff are showing an increasing tendency to winter in the UK and Willow Warblers are very early migrants. In contrast, about half of species whose numbers peaked at the late count are migratory. This tendency for the early counts to sample residents and later counts migrants confirms the value of two visits. Analyses of counts in relation to weather revealed significant effects but these were not consistent among species or between years. The main reason for this is that weather influences bird behaviour and the ability of the observer to detect birds. Counts in unfavourable conditions, i.e. with high wind, low visibility, heavy cloud or rain, tended to be less reliable, and we recommend that counts be carried out in relatively favourable conditions.

We also looked at the possibility that the highly variable counts for species that occur in non-breeding flocks might conceal the genuine population trends. To test this, we compared annual population indices for waders, waterfowl and gulls that excluded counts that were greater than various thresholds to indices using unmodified counts. Five widespread waders are often recorded in large aggregations, and exclusion of single-section counts greater than 10 was most effective in removing extra-high counts without changing the distribution. Gulls often form large flocks but these are likely to be breeding birds near colonies. Similarly, although high counts of ducks or geese may include non-breeders, they also reflect higher densities near bodies of water. Hence, BBS analyses are now corrected for unusually high counts of waders but not, at present, for waterfowl or gulls. Recalculation of the 1994-97 population indices for waders revealed that instead of experiencing significant declines, Oystercatcher, Golden Plover and Redshank populations were stable, whereas Curlew and Lapwing numbers had significantly declined. The 1998 data, shown in Table 6, reveal that counts of Curlew and Lapwing continue to decline, and that the decline in Oystercatcher is now significant.

The reason that we do not report population changes for species that occur in fewer than 50 squares is that the confidence intervals are usually too large to detect changes. An analysis of sample-size effects for about eight species on the verge of being routinely monitored, suggested that our estimates for Pied Flycatcher are sufficiently precise for this species to be added to Table 6. Additional species may continue to be added as our data base grows.

BBS data used to address ecological niche theory

It is a well-known but little understood phenomenon that bird species with large geographic ranges (e.g. Chaffinch) are usually also very abundant, whereas species with restricted distributions (e.g. Spotted Flycatcher) tend to be locally rare. A recent study by Richard Gregory and Kevin Gaston (*Oikos*, in press) used BBS data to investigate this relationship. By comparing measures of abundance and distribution from the 1996 BBS to land use and environmental variables derived from satellite imagery, they were able to calculate niche breadth (a measure of the range of environmental conditions that a particular species will tolerate) and niche position (the extent to which a particular species utilises atypical resources). Across all bird species, abundance and distribution were related to niche position but not to niche breadth. This supports the argument that some species are both widespread and abundant because they utilise resources that are themselves widespread and abundant, and not because they occupy broad ecological niches.



What will the future hold for familiar species like the Lapwing. We hope to provide useful data to aid the conservation of this species. (Artwork by Andy Wilson)

UK mammal monitoring and the BBS

The UK government, through the Department of the Environment, Transport and the Regions (DETR) and the JNCC, are currently developing proposals for national mammal monitoring. In this context, the JNCC recently asked the BTO to review the options for mammal monitoring, particularly with regard to the use of volunteers. Our review revealed that, while considerable effort is put into monitoring various mammal species or groups, there is little co-ordination of this effort and there are significant geographical and species gaps. The mammal data collected by BBS volunteers could therefore have a key role to play. With the large BBS sample size and the wide range of species recorded, a great deal of useful information for mammal monitoring could be gleaned from the BBS. Statistical analyses by Steve Freeman (Ecological Statistician at the BTO) show that BBS data have the potential to detect a 25% decline over 25 years (a benchmark used to place birds on the Amber List of *Birds of Conservation Concern*) for almost all of the 17 species currently listed on the BBS mammal form.

With this in mind, BTO have recommended to JNCC that BBS mammal recording should be an important contributor to the future monitoring of UK mammal populations but should run alongside several other, new multi-species and single-species schemes. However, some changes to BBS mammal recording will be necessary to maximise its usefulness: most importantly, we need to clarify how volunteers should assess the presence or absence of a species from their surveys squares. We also need to stress that count data

for species like Brown Hare, Grey Squirrel and Rabbit are very useful, whereas indications of presence are likely to be sufficient for Mole, Stoat or Weasel. We will address this before the 2000 field season. At this stage, the important point is that the BBS has enormous potential to supply much-needed information on our mammal populations. The data contributed by BBS volunteers under the trial survey have provided a baseline for future monitoring and have also enabled us to present a compelling case to government as to the potential value of BBS mammal recording.

Contributed by Dr Gavin Siriwardena, BTO Population Biologist

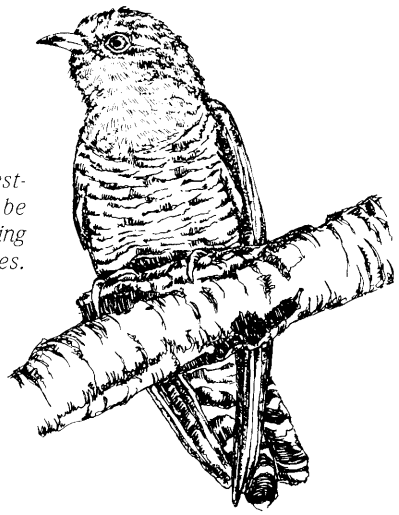
The Countryside Bird Survey - progress report

Following the workshop run by Richard Gregory and Richard Bashford in Kilkenny in January 1998, BirdWatch Ireland launched the Countryside Bird Survey (CBS) by conducting a series of 12 one-day workshops around Ireland. Although recruitment of volunteer surveyors was the main objective, these sessions proved very useful in clarifying what at first glance can appear complicated survey methods. Basic bird identification was covered, with an emphasis on bird sounds. National Parks & Wildlife rangers also took part in workshops. 1998 was the first year of the CBS — the same methodology as the BBS is used, so it will be possible to merge data from Britain and Ireland. Targets were set and more than met, with a total of 328 1-km squares being issued. A healthy return rate of 79% was achieved — a total of 260 squares having been surveyed.

The results from the 1998 season are still being compiled, but preliminary analysis shows Blackbird, Robin and Wren almost in joint first place as the most widespread species in Ireland, being recorded in around 93% of squares surveyed. Swallow, in fourth place, was found in 89% of squares, while Song Thrush, the subject of much recent concern over its declining numbers, ranked ninth (81%). The once common and widespread Yellowhammer was found in only 25% with a distribution bias towards the east and southeast of the country, where tillage and especially cereal growing is more prevalent. Of the 105 species recorded in the survey, 22 were found in 100 squares or more. Increased coverage in years to come should bring considerably more species over this threshold, thus improving the reliability of species monitoring. The number of species per square ranged from one to 44, with some 63% of squares recording between 20 and 34 species.

Another round of workshops in the first quarter of 1999 was well attended and helped consolidate the volunteer base as well as attract new surveyors. The total of squares issued in 1999 is 382 (almost 60 additional to the 1998 allocation). Working with a relatively low number of active birdwatchers in Ireland, it remains to be seen where the number of new squares issued each year will bottom out, but it is encouraging to note how many people have undertaken more than one square in 1999 (several have taken on four and one even six!). A questionnaire circulated to volunteers after the 1998 season revealed that almost 50% of participants in the CBS had never taken part in a bird survey before. Most people kept the same squares in 1999 and it is expected that the quality and volume of data will improve over the coming years.

Contributed by Dick Coombes - IWC Birdwatch Ireland



The Cuckoo, one of our best-known birds, appears to be declining in the UK but increasing in both Scotland and Wales. (Artwork by Maxine Grover)

Using BBS data for conservation

BBS data is widely used by JNCC and the country conservation agencies to underpin many bird conservation initiatives. Currently the main uses relate to a wide range of activity aimed at developing policies to address the plight of declining farmland birds.

Even just a few years ago, however, the debate within government was different and focussed on whether or not farmland birds *were* actually declining. Things have now moved significantly onwards, and today the debate rather concerns what precise measures need to be undertaken to halt and reverse observed trends. Much of the credit for moving this debate forward must go to BTO and its membership, for the high quality data that are collected year after year (such as those in this fourth BBS report) that have shown themselves to be robust against scientific challenge. Consequently, we are now discussing with government how best to halt and reverse the observed downward trends reported here.

In possibly one of the most significant announcements for bird conservation for many years, the government announced last autumn that trends of breeding farmland birds would be one of the 13 main 'headline indicators' of UK sustainable development. The "Skylark Index" - as it was immediately dubbed by the media - will be annually reported, and will be one of the main means by which the government has said the success of its countryside policies should be judged. This is an enormously bold step forward.

This 'quality of life' indicator, and the use of BBS data to inform the implementation of Biodiversity Action Plans for a range of declining farmland birds, now puts BTO data collection at the forefront of monitoring UK implementation of two of the Rio initiatives: the Sustainable Development Convention and the Biodiversity Convention.

Keep counting! Never before have ornithological data such as these had greater direct effect on the development of government countryside policies.

Contributed by David Stroud, JNCC.

THE FUTURE

The overwhelming response to the call for BBS volunteers has given us a huge amount of scientific data, vital to the conservation of our breeding birds. Our target coverage seems just around the corner but we must now concentrate on maintaining this number of squares on an annual basis. As highlighted in this report, we will only issue new squares in certain areas where they are needed. There are now enough spare squares available to allow us to reach our target. Our immediate concern is the need to increase volunteer coverage in the remoter parts of Scotland. We are, as ever, very keen to hear from anyone who would be able to help cover squares in these areas. We hope to highlight the longer-term national trends further as they emerge and also the country-based summaries. With excellent numbers of squares now covered in Scotland and Wales annually, we have been able to produce valuable information for these countries for the first time. It is now extremely important to ensure we can maintain this coverage and so continue producing this information.

The success of the BBS is dependent on volunteer support throughout the UK. The most valuable data are collected from squares covered by the same observer year after year. We greatly appreciate your continued support.

Please spread the word to other birdwatchers you may know or even consider taking on another square if you have time. Thanks once again for all your hard work.

If you would like to take part in the BBS, we would be pleased to hear from you.

SPECIAL THANKS

We would like to thank all BBS volunteers and ROs for making the survey the success it is today. Space does not permit all observers to be acknowledged individually, but we would like especially to thank the ROs for their efforts. ROs at the time of writing are:

BBS Regional Organisers

ENGLAND: Avon - John Tully; Bedfordshire - Phil Cannings; Berkshire - Chris Robinson; Birmingham & West Midlands -Jim Winsper; Buckinghamshire - Mick A'Court; Cambridgeshire - Roger Clarke; Cheshire (mid) - Paul Miller; Cheshire (north & east) - David Jones; Cheshire (south) - Charles Hull; Cleveland - Russell McAndrew; Cornwall - Paul Stubbs; Cumbria (north) - John Callion; Cumbria (south) - Ian Kinley; Derbyshire (north) - Oly Bidduiph; Derbyshire (south) - Dave Budworth; Devon - John Woodland (temporary cover); Dorset - Catherine Whitby; Durham - David Sowerbutts; Essex (north-east) - Peter Dwyer; Essex (north-west) - Geoff Gibbs; Essex (south) - Jean Stone; Gloucestershire - Rob Purveur; Hampshire - Glynne Evans; Herefordshire - Steve Coney; Hertfordshire - Chris Dee; Huntingdon & Peterborough - Bob Titman; Kent - Geoffrey Munns; Lancashire (east) - Tony Cooper; Lancashire (north-west) - Dave Sharpe; Lancashire (south) - David Jackson; Leicestershire & Rutland - Jim Graham; Lincolnshire (east) - Rob Watson; **Lincolnshire (north) - vacant**; Lincolnshire (south) - Richard and Kay Heath; Lincolnshire (west) - Peter Overton; London & Middlesex - Derek Coleman; Manchester - Judith Smith; Merseyside - David Glasson; Norfolk (north-east) - Moss Taylor; Norfolk (north-west) - Mike Barrett; **Norfolk (south-east) - vacant**; Norfolk (south-west) - Vincent Matthews; Northamptonshire - Phil Richardson; Northumberland - Tom and Muriel Cadwallender; Nottinghamshire - Lynda Milner; Oxfordshire (north) - Roger Evans; Oxfordshire (south) - Peter Abbott; **Rugby - vacant**; Isles of Scilly - Will Wagstaff; Shropshire - Allan Dawes; Somerset - Eve Tigwell; Staffordshire (central) - Frank Gribble; Staffordshire (north) - Alan Hancock; Staffordshire (south) - Peter Dedicoat; Suffolk - Mick Wright; Surrey - Hugh Evans; Sussex - Barrie Watson; Warwickshire - Joe Hardman; Isle of Wight - James Gloyn; **Wiltshire (north) - vacant**; Wiltshire (south) - Andrew Carter; Wirral - Kelvin Britton; Worcestershire - Harry Green; Yorkshire (north-west) - Malcolm Priestley; Yorkshire (north) - John Edwards; Yorkshire (Harrogate) - Mike Brown; **Yorkshire (East) - vacant**; Yorkshire (north-east) - Peter Ottaway; Yorkshire (Bradford) - Mike Denton; Yorkshire (York) - Peter Hutchinson; Yorkshire (Leeds & Wakefield) - Peter Smale; Yorkshire (south-east & south-west) - Chris Falshaw. **ISLE OF MAN**: Pat Cullen. **SCOTLAND**: Aberdeen (north) - Paul Doyle; Aberdeen (south) - Graham Cooper; Angus - Ken Slater; Argyll (north & south inc. Mull) - David Wood; Arran - David Fowler; Ayrshire - Paul Darnborough; Benbecula & The Uists - Paul Boyer; Borders - Alex Copland; Caithness - Neil Money; Central Scotland - Neil Bielby; Dumfries - Richard Mearns; Fife & Kinross - Norman Elkins; Inverness - Hugh Insley; Islay, Jura & Colonsay - Malcolm Ogilvie; Kirkcudbright - Brian Smith; **Lanark, Renfrew & Dunbarton - vacant**; Lewis & Harris - Tony Pendle; Lothian - Alan Heavisides; Moray & Nairn - Bob Proctor; Orkney - Colin Corse; Perthshire - Simon Burton; Ross-shire - Dave Butterfield; Shetland - Dave Okill; Skye - Roger and Pat Cottis; Small isles (Rum, Eigg, Muck, Canna) - Bob Swann; Sutherland - Neil Money; Wigtown - Geoff Sheppard. **WALES**: Anglesey - Jim Clark; Caernarfon - John Barnes; Brecon - John Lloyd; Cardigan - Moira Convery; Carmarthen - David Poulter; Clwyd (east) - Andrew Gouldstone; Clwyd (west) - Peter Wellington; Glamorgan (west) - Dave Hanford; Glamorgan (mid and south) - Rob Nottage; Gwent - Jerry Lewis; Merioneth - Peter Haveland; Montgomery - Brayton Holt; Pembrokeshire - Rod Hadfield; Radnorshire - Pete Jennings. **CHANNEL ISLANDS** - Ian Buxton. **NORTHERN IRELAND**: Co Antrim - Anita Donaghy; Co Armagh - David Knight; Co Down - Alistair McIlwain; Co Fermanagh/Tyrone (south) -Phil Grosse; Co Londonderry - Charles Stewart; Co Tyrone (north) - Mary Mooney.

Many thanks also to the following ROs who have retired during the last year and contributed significantly in developing BBS in their respective regions: Ray Broad, Seamus Burns, Julian Friese, Paul Gallant, David Hughes, Wendy Oliver, David Porter, Andrew Ramsey, Graham Rees, Clive Richards, Ian Shepherd, John Simpson, George Smith, Bobbie Somerville, Matt Southam, John Tranter and Richard Williams.

Coverage in areas without a Regional Organiser (in bold) is co-ordinated from the Census Unit. Please contact Richard Bashford in the Census Unit if you would be able to take on the role of Regional Organiser in any of these regions.

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