Population changes of certain opportunistic bird species in the United Kingdom between 1985 and 1994

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SUMMARY

Population trends of Woodpigeon Columba palumbus*, Collared Dove* Streptopelia decaocto*, Jay* Garrulus glandarius*, Magpie* Pica pica*, Jackdaw* Corvus monedula*, Rook* C. frugilegus*, Carrion Crow* C. corone*, Starling* Sturnus vulgaris *and House Sparrow* Passer domesticus *were examined over the period 1985 to 1994 using data from the Common Birds Census. Substantial increases were found for Carrion Crow, Woodpigeon and Collared Dove, and decreases for Starling and House Sparrow. Our results are discussed in the context of the long-term changes in bird populations that have been reported since the start of this century. The status of seven of the species is secure, but we recommend* ***Conservation Vigilance*** *for Starling and House Sparrow.*

1. INTRODUCTION

The Wildlife and Countryside Act (1981) listed thirteen opportunistic bird species, Lesser Black-backed Gull *Larus fuscus*, Herring Gull *L. argentatus*, Great Black-backed Gull *L. marinus*, Feral Pigeon *Columba livia*, Woodpigeon *C. palumbus*, Collared Dove *Streptopelia decaocto*, Jay *Garrulus glandarius*, Magpie *Pica pica*, Jackdaw *Corvus monedula*, Rook *C. frugilegus*, Carrion Crow *C. corone*, Starling *Sturnus vulgaris* and House Sparrow *Passer domesticus*, under Schedule 2, Part II. Under this legislation as originally enacted, birds of all these species could be controlled at any time. All species have recently been removed from that schedule, to bring Great Britain into line with the requirements of the European Community for the protection of all wild birds. However, the United Kingdom Government has secured a derogation in respect of these thirteen species under Article 9 of the European Directive on the Conservation of Wild Birds (EC/79/409). Since January 1993 a licensing system has been in operation by which the UK Government can issue a general licence, under section 16 of the Wildlife and Countryside Act, for the taking of these species in the interests of health and safety or to prevent serious damage to livestock and crops, or for the protection of flora and fauna. The derogation entails a responsibility to monitor these species to provide data that indicate their population levels and trends.

The population levels of these opportunistic species are of special interest to birdwatchers and conservationists alike. In particular, several of the corvids have shown long-term changes in population status (Parslow 1973, Marchant *et al*. 1990). Magpie, and to a lesser extent Carrion Crow, are important predators of eggs and nestlings (Potts 1986, Gooch *et al*. 1991, Groom 1993). It has been suggested that their population increases may have been a cause of parallel declines of open-nesting species, although there is little direct support for this (Potts 1986, Gooch *et al*. 1991, Groom 1993). All thirteen species are familiar and widespread birds whose interests sometimes conflict with those of man. There is therefore considerable value in monitoring their status as ‘pest species'.

The Common Birds Census (CBC), operated by the British Trust for Ornithology since 1962, is the only source of data on trends in breeding population for the period and species included in this study (Marchant *et al*. 1990). Most CBC plots are on farmland or in woodland; the data are used to monitor population changes and study fine-scale distribution patterns among birds, particularly in these two types of habitat. Standard reporting of population change covers farmland and woodland, combining plots throughout the United Kingdom; a small number of scarcer species are monitored by combining data from all habitat types. More than thirty years' data on United Kingdom bird populations are now available.

The CBC forms an invaluable resource for the study of population changes in around 75 bird species. Species for which the CBC can monitor population levels are generally the commonest and most widespread British birds. Among the species previously in Schedule 2, Part II, the gulls and Feral Pigeon, though all with large breeding populations in the United Kingdom, are too scarce in the habitats surveyed by the CBC for monitoring to be possible. Rook, although both numerous and widespread, has not routinely been indexed because of its highly clumped nesting distribution. Rooks are recorded as present during the breeding season on most CBC plots, but only active nests are counted for monitoring purposes. Nesting was reported on between 2% and 12% of plots in 1965-88 (Marchant *et al*. 1990), so that samples of plots available for population indexing have been relatively low. Total counts of nests on CBC plots

have, however, been substantial in recent years and sufficient to indicate the population trend over the past decade.

The CBC data for the ten-year period 1985-94 are presented in this report for all of the terrestrial species formerly listed on Schedule 2, Part II, with the single exception of Feral Pigeon for which insufficient data were available. Feral Pigeon populations will be monitored as from 1994 by the new Breeding Bird Survey: the first results will be available after the 1995 survey.

2. METHODS

2.1 Census methods

CBC observers use the mapping method to gather information each spring and summer on the numbers and distribution of breeding bird territories on plots throughout the United Kingdom (Marchant 1983, Marchant *et al*. 1990). Observers make a series of visits to their plot through the breeding season to record all the birds seen or heard. This information is used to identify clusters of registrations which are taken to represent breeding territories.

CBC plots are classified mostly as either farmland or woodland. A smaller number of 'special' plots are of other habitat types. Farmland plots reflect the general nature of farmland landscapes in that they often contain small areas of woodland. Plots of all three classes may contain or be bordered by houses and gardens.

The numbers and mean areas of census plots during 1985-94 are shown in Table 1 for each class of habitat. These are the plots that were available for analysis: some late returns are expected to add to these totals, especially for 1994. The 1994 farmland total represents about 95% of the expected final total, while no more woodland or special plots are certain to arrive. Thus the analysis is based on about 98% of the final results for 1994.

Table 1.Numbers of plots censused in the United Kingdom during 1985-94, classified by broad habitat type.

Year	Farmland		Woodland		Special habitats		All habitats combined	
	Number	Mean area (ha)	Number	Mean area (ha)	Number	Mean area (ha)	Number	Mean area (ha)
1985	100	73.4	102	20.4	47	33.6	249	44.2
1986	99	72.7	92	20.0	34	34.3	225	45.3
1987	101	69.8	95	20.9	29	45.9	225	46.1
1988	100	74.4	86	20.1	25	33.9	211	47.5
1989	102	73.1	96	20.8	21	32.2	219	46.3
1990	99	73.2	97	21.6	25	37.3	221	46.5
1991	101	71.6	103	21.6	23	35.4	227	45.3
1992	96	73.7	103	21.8	23	35.4	222	45.7
1993	102	74.2	111	20.7	24	34.0	237	45.1
1994	95	69.8	110	20.9	24	32.6	229	42.5

The reduction during the first three or four years in the number of special plots was the result of a policy decision to concentrate resources more into farmland and woodland. There was then a progressive reduction in the contribution of special plots to the all habitats index data. No other major changes in the structure of the sample have occurred during this period, despite an annual turnover rate typically in the range 12-15%.

2.2 Estimation of population change

Annual population changes are standardly estimated from the CBC by pairing territory totals on each plot in successive years, using only those plots providing data collected in a comparable way. Estimates of population change between the first and second years of a comparison are calculated from the totals of paired counts across plots. Successive estimates of year-to-year change are converted to long-term trends by the chain-index method, in which the values of a population index, set at 100 in an arbitrary datum year, are calculated by applying each annual change successively to the previous value (Marchant *et al*. 1990).

The distribution of the census plots, 366 in total, that contributed to the estimates of percentage change during 1985-94 is plotted in Figure 1. All regions of the United Kingdom were represented except the Northern and Western Isles.

2.3 Present limitations of the trend data

The population trends presented here are drawn from the only extensive census data-set using the best analysis methods presently available. However, neither data nor methods of analysis are the best that could be achieved (Baillie & Marchant 1992).

The limitations of the CBC data as measures of United Kingdom population trends were set out by Marchant *et al*. (1990). The most important are the geographical bias of census plots towards the south and east of Britain (Figure 1), the restriction of coverage to farmland and woodland habitats, and the relative shortage of census plots compared to the number that could be achieved using simpler methods to collect the data. These limitations were addressed by BTO and JNCC in the design of methods for a new census scheme, the Breeding Bird Survey (BBS), which began in the spring of 1994. BBS uses random selection of census sites to ensure that sampling is representative both geographically and in terms of habitat.

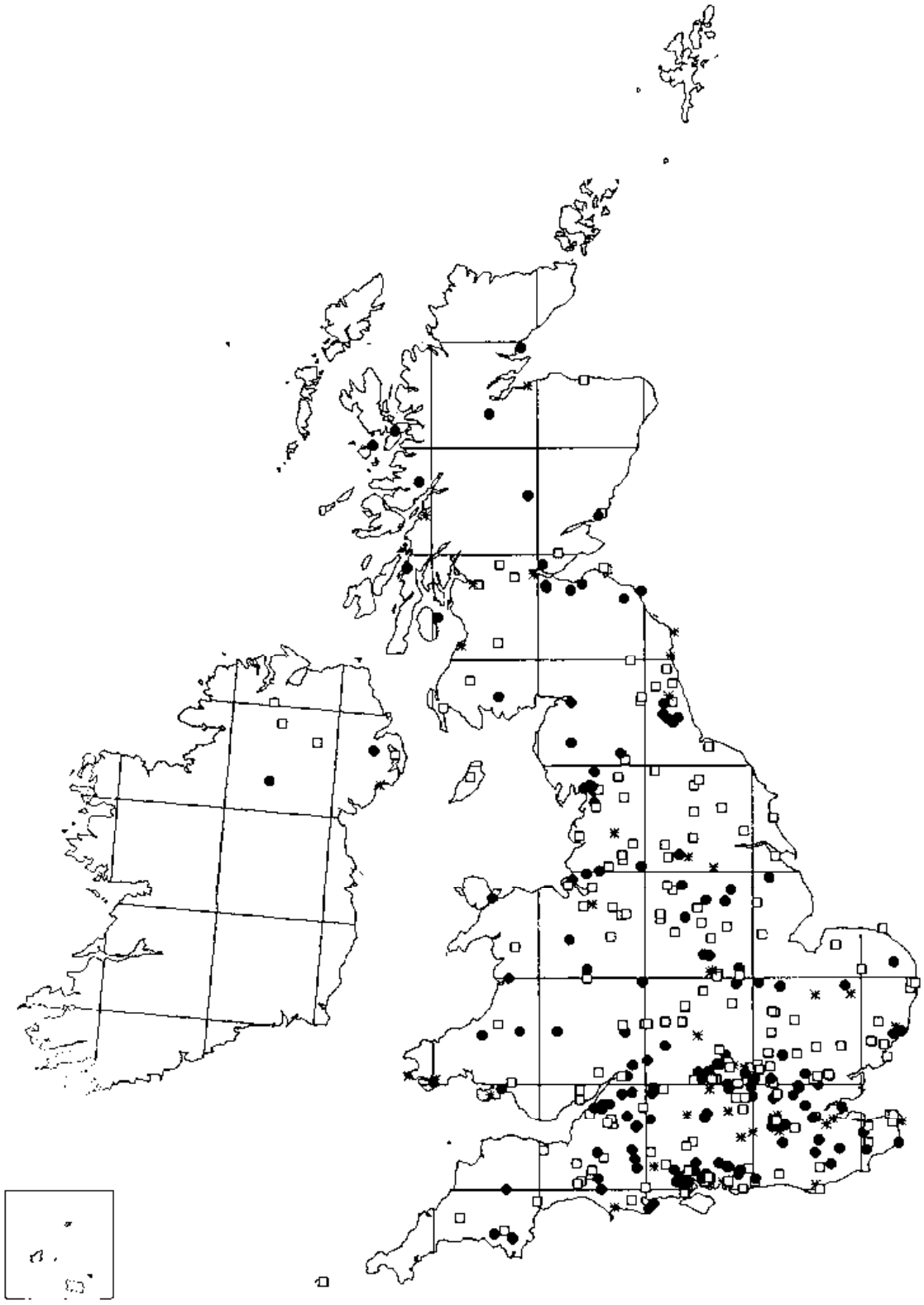

Figure 1.The distribution of Common Birds Census plots contributing data to estimates of percentage change between 1985 and 1994. Habitat categories are shown separately: open squares - farmland; filled circles - woodland; asterisks - special habitats.

3. RESULTS AND DISCUSSION

The results are discussed first by species and then generally.

A regional analysis of trends has been carried out recently, covering the period 1983-93 (Marchant in press). Regions used were the 11 NUTS (Nomenclature of Territorial Units for Statistics) regions of the United Kingdom. The results of this analysis are summarised under the species headings.

3.1 Woodpigeon *Columba palumbus*

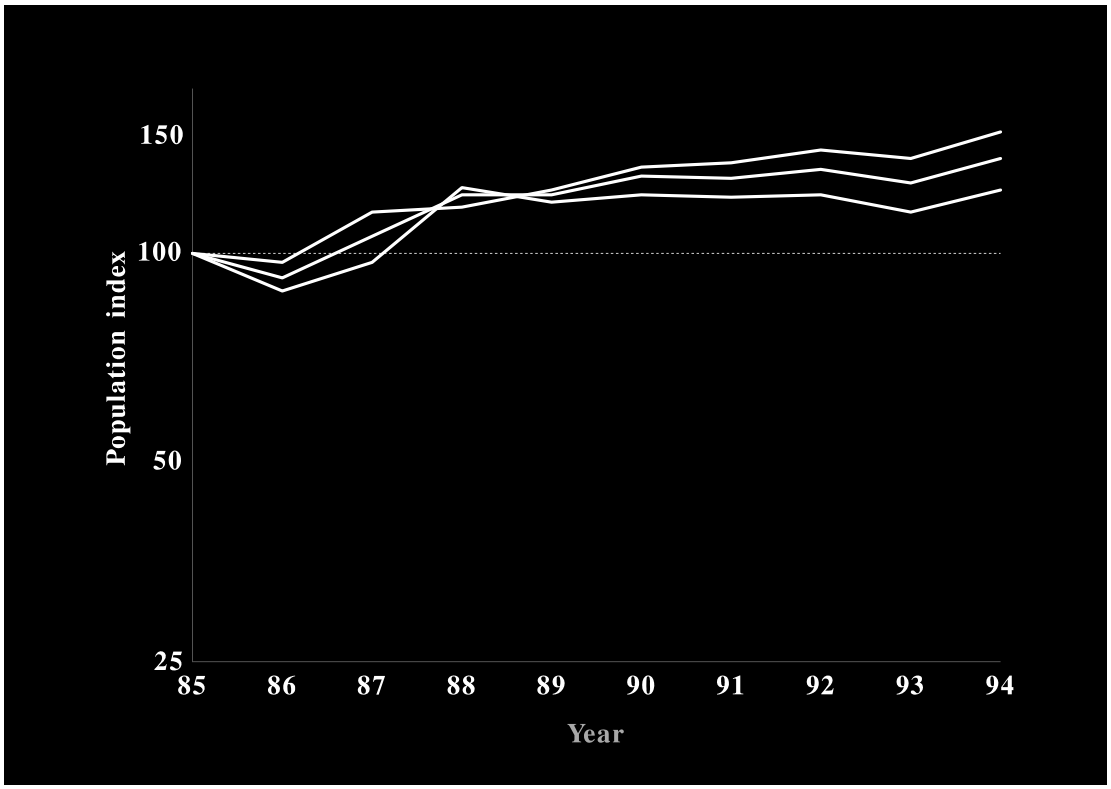

Figure 2.CBC population changes between 1985 and 1994 for Woodpigeon on farmland (dotted line), in woodland (dashed line) and in all habitats combined (solid line). Index values are relative to 100 in 1985.

The overall population trend in the United Kingdom between 1985 and 1994 was clearly upwards. CBC data also show increases in both farmland and woodland during the previous ten years, following a period of decrease during the early to mid 1970s (Marchant *et al*. 1990). Inglis *et al*. (1990) regarded the acreage of oilseed rape, which has increased since the late 1970s, as an important factor limiting the population. In recent years the increase appears to have slowed and may effectively have ceased.

A regional analysis of trends (Marchant in press) showed significant increases in five regions, but a significant shallow decline in numbers in Scotland.

CBC monitoring of Wood Pigeon numbers is of poor quality in relation to other species, for two main reasons (Marchant *et al*. 1990). First, Wood Pigeons have a long breeding season and may nest in any month. Many nest late in the breeding season, after CBC fieldwork has finished for the year. There is evidence that the proportion of breeding attempts occurring within the March-July census period has increased (O'Connor & Shrubb 1986): this would have the effect of biasing the CBC trend towards increase. O'Connor & Shrubb linked the advancing breeding season with changes in farmland management, particularly the switch from spring to autumn sowing which advances the ripening of crops. Second, CBC observers often cannot estimate breeding numbers on plots where Wood Pigeons are dense. No data entered the index calculations from such plots. Thus the CBC trends were drawn particularly from plots where density was relatively low, and were based on the assumption that trends on plots of high and low density were similar.

Population trend:Recent increase still evident in late 1980s, now perhaps levelled off
Conservation status or concern: Status secure

Table 2.Population changes for Woodpigeon in the UK, as measured by the Common Birds Census. The index is chained from percentage changes in the year totals of territories, drawn from paired plots surveyed similarly in the two years: the number of contributing plots is shown. Confidence limits were calculated according to the method of Baillie *et al* (1986). Statistically significant changes are marked with an asterisk.

Habitat	Year (year 2)	Year 1 total	Year 2 total	Number of plots	% change	Lower 95% c.l.	Upper 95% c.l.	Index (1985 = 100)
All habitats combined	**85**							**100**
	86	717	660	87	**-8**	-17	+2	**92**
	87	686	790	96	**+15***	+6	+26	**106**
	88	777	894	103	**+15***	+7	+24	**122**
	89	884	884	103	**0**	-8	+9	**122**
	90	940	1002	112	**+7**	0	+14	**130**
	91	1005	995	112	**-1**	-7	+6	**129**
	92	1079	1118	120	**+4**	-3	+10	**133**
	93	1165	1112	132	**-5**	-10	+1	**127**
	94	1116	1212	142	**+9***	+2	+16	**138**
Farmland plots	**85**							**100**
	86	227	220	30	**-3**	-17	+13	**97**
	87	292	346	39	**+18***	+5	+35	**115**
	88	366	372	45	**+2**	-8	+12	**117**
	89	402	427	51	**+6**	-9	+22	**124**
	90	475	512	58	**+8**	-2	+19	**134**
	91	485	495	54	**+2**	-7	+12	**136**
	92	516	539	57	**+4**	-6	+15	**142**
	93	574	554	61	**-3**	-12	+6	**138**
	94	515	565	65	**+10***	+2	+19	**151**
Woodland plots	**85**							**100**
	86	387	342	40	**-12**	-25	+5	**88**
	87	346	380	46	**+10**	-4	+28	**97**
	88	331	428	44	**+29***	+16	+43	**125**
	89	395	373	41	**-6**	-16	+6	**119**
	90	381	392	43	**+3**	-8	+16	**122**
	91	419	416	47	**-1**	-9	+9	**121**
	92	427	432	47	**+1**	-8	+11	**122**
	93	489	459	56	**-6**	-14	+2	**115**
	94	493	531	61	**+8**	-4	+20	**124**

3.2 Collared Dove *Streptopelia decaocto*

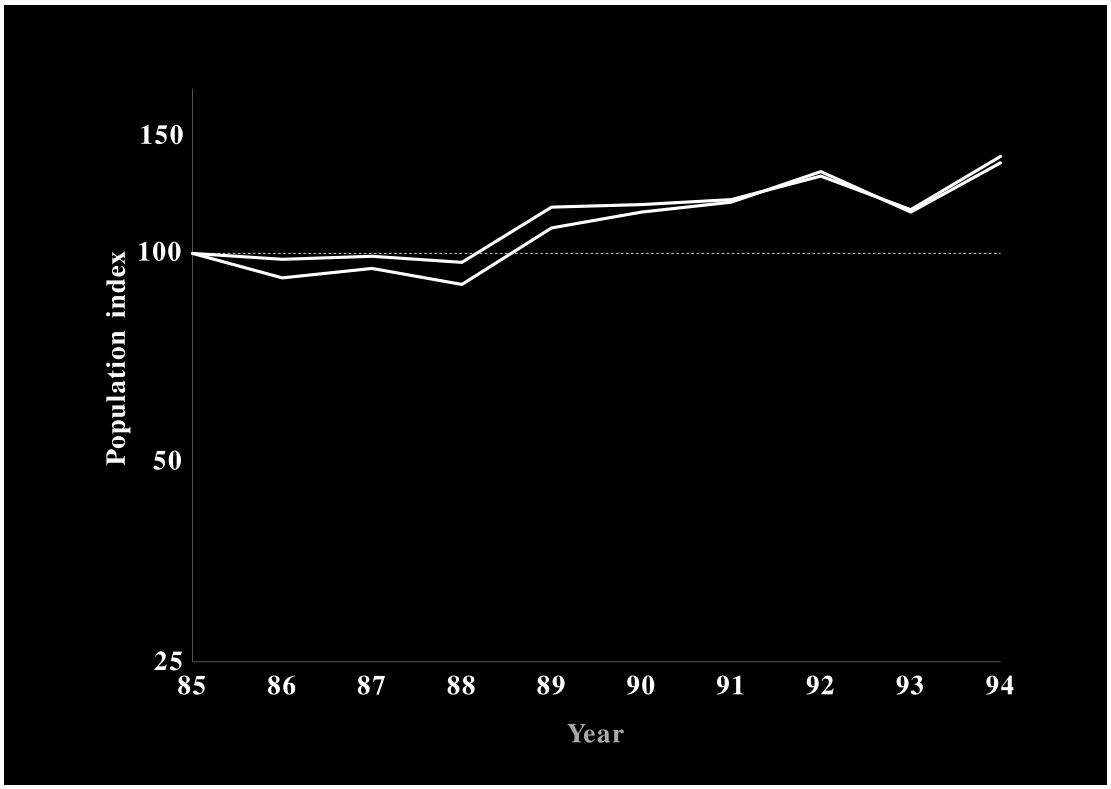

Figure 3.CBC population changes between 1985 and 1994 for Collared Dove on farmland (dotted line) and in all habitats combined (solid line). Index values are relative to 100 in 1985.

The spectacular rise in Collared Doves during the first decades of the CBC ended about 1982 (Marchant *et al*. 1990). There was no overall trend in the United Kingdom during the rest of the 1980s, but on farmland at least a renewal of increase during the early 1990s. The woodland sample size is relatively small and results are therefore presented only for farmland and all habitats (Figure 3, Table 3).

A regional analysis for the period 1983-93 found an increase in North England to be the only statistically significant regional trend (Marchant in press).

The CBC monitors particularly the farmland section of the population. Results may not be representative of the whole population because the species reaches its highest densities in urban and suburban environments.

Population trend:Renewed shallow increase, following earlier spectacular increase and stability

Conservation status or concern: Status secure

Table 3.Population changes for Collared Dove in the UK, as measured by the Common Birds Census. The index is chained from percentage changes in the year totals of territories, drawn from paired plots surveyed similarly in the two years: the number of contributing plots is shown. Confidence limits were calculated according to the method of Baillie *et al* (1986). Statistically significant changes are marked with an asterisk.

Habitat	Year (year 2)	Year 1 total	Year 2 total	Number of plots	% change	Lower 95% c.l.	Upper 95% c.l.	Index (1985 = 100)
All habitats combined	**85**							**100**
	86	206	202	89	**-2**	-14	+10	**98**
	87	173	175	75	**+1**	-12	+17	**99**
	88	178	174	82	**-2**	-20	+16	**97**
	89	171	206	82	**+20***	+7	+40	**117**
	90	190	192	83	**+1**	-13	+16	**118**
	91	185	188	79	**+2**	-13	+19	**120**
	92	198	215	87	**+9**	-7	+29	**130**
	93	185	165	79	**-11**	-24	+6	**116**
	94	150	180	77	**+20***	+5	+39	**139**
Farmland plots	**85**							**100**
	86	135	124	48	**-8**	-23	+7	**92**
	87	123	127	46	**+3**	-11	+24	**95**
	88	128	122	50	**-5**	-26	+15	**90**
	89	122	147	49	**+20***	+4	+47	**109**
	90	131	138	49	**+5**	-12	+21	**115**
	91	130	135	47	**+4**	-14	+28	**119**
	92	135	149	49	**+10**	-10	+39	**132**
	93	130	114	47	**-12**	-28	+10	**115**
	94	100	118	47	**+18***	+2	+41	**136**

3.3 Jay *Garrulus glandarius*

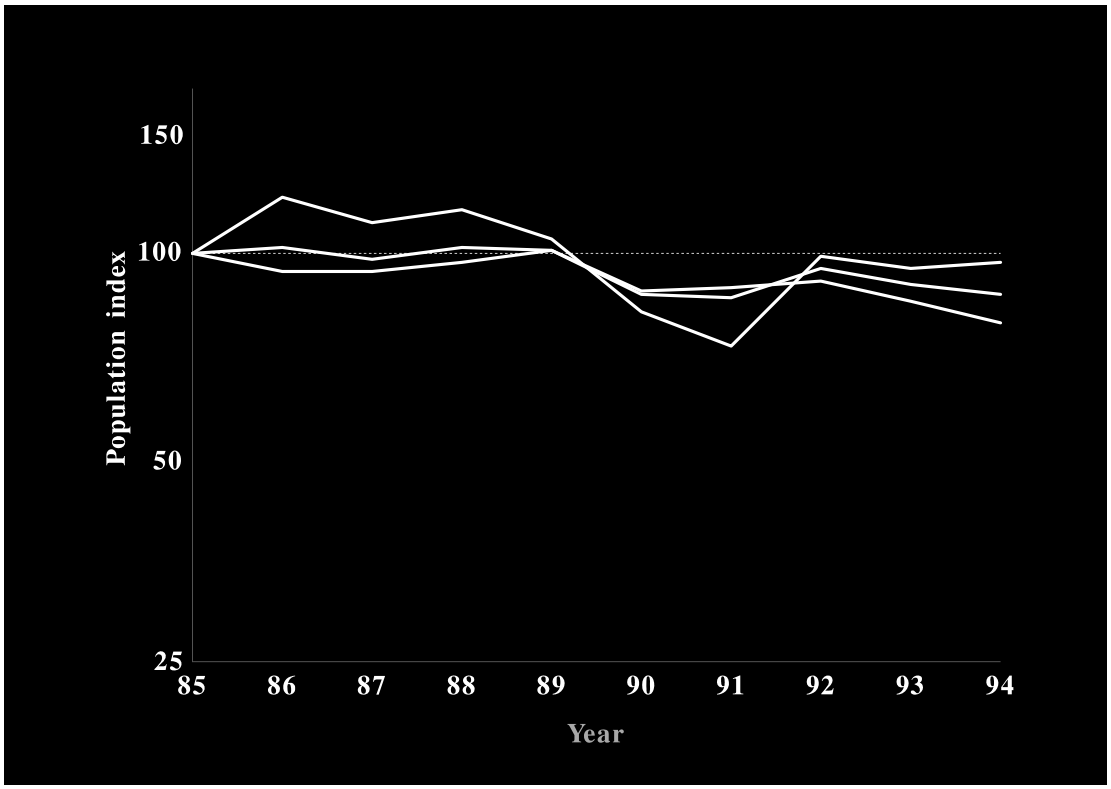

Figure 4.CBC population changes between 1985 and 1994 for Jay on farmland (dotted line), in woodland (dashed line) and in all habitats combined (solid line). Index values are relative to 100 in 1985.

Jay populations were stable or shallowly decreasing in woodland and on farmland densities during 1985-94. The relatively low numbers on farmland may have been responsible for the apparently greater fluctuation in that habitat. Jays appear to have been increasing over the last 50 years (Parslow 1973, Marchant *et al*. 1990), although data from the *New Atlas* show a small reduction between 1970 and 1990 in the number of occupied squares (Gibbons *et al*. 1993). There has been, however, some northward extension of the breeding range in Northern Ireland and in Scotland since 1968-72.

Regionally, decreases during 1983-93 were statistically significant in East Midlands and West Midlands.

Population gains are thought to be due to reduced control by gamekeepers and to the creation of new woodlands (Prestt 1965, Sharrock 1976, Gibbons *et al*. 1993). Some support for the control argument is provided by the Game Conservancy Trust's National Game Bag Census (NGBC) which shows the numbers of Jays killed on a sample of estates managed for shooting to have fallen between 1961 and 1989 (Tapper 1992). The majority of Jays in this sample are killed in winter and they may not be resident birds (S Tapper, pers. comm.). It should be noted first that, like the CBC, the NGBC is not be based upon a random sample and, second, that there is no control for differences in keepering effort across estates.

Population trend:Shallow decrease during 1985-94; stable in the longer term

Conservation status or concern: Status secure

Table 4.Population changes for Jay in the UK, as measured by the Common Birds Census. The index is chained from percentage changes in the year totals of territories, drawn from paired plots surveyed similarly in the two years: the number of contributing plots is shown. Confidence limits were calculated according to the method of Baillie *et al* (1986). Statistically significant changes are marked with an asterisk.

Habitat	Year (year 2)	Year 1 total	Year 2 total	Number of plots	% change	Lower 95% c.l.	Upper 95% c.l.	Index (1985 = 100)
All habitats combined	**85**							**100**
	86	194	198	117	**+2**	-8	+14	**102**
	87	200	193	116	**-4**	-15	+8	**98**
	88	170	176	108	**+4**	-7	+15	**102**
	89	174	172	107	**-1**	-10	+9	**101**
	90	186	160	108	**-14***	-22	-6	**87**
	91	162	160	108	**-1**	-10	+8	**86**
	92	179	199	121	**+11***	0	+23	**95**
	93	195	185	118	**-5**	-15	+6	**90**
	94	187	180	116	**-4**	-13	+7	**87**
Farmland plots	**85**							**100**
	86	38	46	34	**+21**	-6	+61	**121**
	87	48	44	36	**-8**	-32	+20	**111**
	88	47	49	34	**+4**	-17	+32	**116**
	89	54	49	37	**-9**	-26	+11	**105**
	90	50	39	32	**-22***	-34	-9	**82**
	91	39	35	30	**-10**	-28	+9	**73**
	92	37	50	36	**+35***	+10	+73	**99**
	93	45	43	36	**-4**	-29	+26	**95**
	94	41	42	31	**+2**	-20	+36	**97**
Woodland plots	**85**							**100**
	86	132	124	66	**-6**	-17	+8	**94**
	87	133	133	70	**0**	-13	+14	**94**
	88	108	111	63	**+3**	-9	+16	**97**
	89	105	110	60	**+5**	-7	+18	**101**
	90	123	107	67	**-13***	-24	-2	**88**
	91	110	111	68	**+1**	-10	+12	**89**
	92	121	124	72	**+2**	-9	+16	**91**
	93	129	121	72	**-6**	-17	+6	**85**
	94	125	115	74	**-8**	-19	+4	**79**

3.4 Magpie *Pica pica*

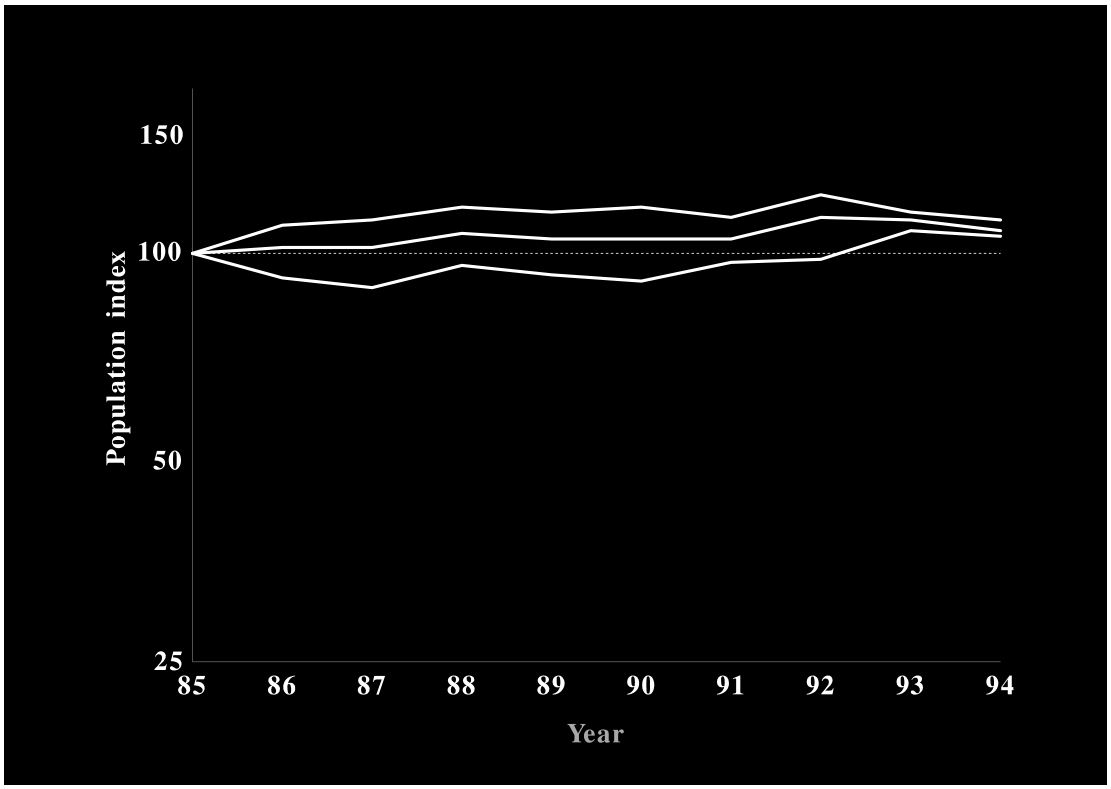

Figure 5.CBC population changes between 1985 and 1994 for Magpie on farmland (dotted line), in woodland (dashed line) and in all habitats combined (solid line). Index values are relative to 100 in 1985.

The CBC has documented substantial increases in Magpie populations between 1964 and 1993 (Gregory & Marchant in press). Trends were similar across habitats and regions, although population gains were limited on arable farms. Regional trends were also described by Gooch *et al*. (1991). Population gains in the southeast since 1964 contrast with the recorded declines in parts of eastern England during the late 1950s and early 1960s. The latter were attributed to the removal of hedgerows and to the use of pesticides (Prestt 1965, Parslow 1973, Cooke 1979). The increases over the last ten years have been very minor (Figure 5), and may indicate that the phase of population increase is ending.

Significant upward trends during 1983-93 were confined to England among United Kingdom NUTS regions, but were detected in six of the eight English regions (Marchant in press). Population gains were largest in East Anglia, but Magpie densities are still low in much of eastern England (Gibbons *et al*. 1993, Gregory & Marchant in press, Marchant in press).

The historical increases in Magpies are believed to stem from reduced levels of control that began at the time of the First World War (Parslow 1973, O'Connor & Shrubb 1986, Tapper 1992). The spread of the breeding range from rural farmland and woodland into suburbia, which is only partly reflected in the CBC data, has contributed to the high rate of increase (Birkhead 1991, Gooch *et al*. 1991). The NGBC has shown a doubling in the number of Magpies killed in Britain between 1961 and 1989, reflecting the population growth (Tapper 1992). In just two more years up to 1991 there was a further doubling in the numbers killed (Tapper & France 1992), but a slight decline in the next two years (S Tapper, pers. comm.). The recent changes are due to the introduction of Larsen traps which represent a remarkably efficient method of trapping breeding Magpies (and Carrion Crows) (Tapper & France 1992). Their recent introduction, however, means that they cannot be responsible for the slowing down of population growth of

Magpie (and Carrion Crow) which began in the late 1970s (Gregory & Marchant in press). Studies of Magpie populations in Sheffield have also shown a reduction in the rate of increase of territorial birds from around 1980, although the numbers of non-territorial birds has continued to increase (Birkhead 1991). The current impact of control measures is difficult to judge but, with the advent of the Larsen trap, it is conceivable that control might limit Magpie numbers.

Links are widely perceived between the increases in Magpies and decreases in open-nesting songbirds. There is evidence from local studies that Magpie predation can reduce Blackbird nesting success to the point where productivity is too low to maintain local populations (Groom 1993). On the national scale, however, Gooch *et al*. (1991) found no decreases in nest success among fifteen species of songbirds that occur alongside Magpies, and no evidence that increases in Magpie numbers were linked with declines in songbird populations.

Population trend:Possibly approaching stability after prolonged and widespread increase

Conservation status or concern: Status secure

Table 5.Population changes for Magpie in the UK, as measured by the Common Birds Census. The index is chained from percentage changes in the year totals of territories, drawn from paired plots surveyed similarly in the two years: the number of contributing plots is shown. Confidence limits were calculated according to the method of Baillie *et al* (1986). Statistically significant changes are marked with an asterisk.

Habitat	Year (year 2)	Year 1 total	Year 2 total	Number of plots	% change	Lower 95% c.l.	Upper 95% c.l.	Index (1985 = 100)
All habitats combined	**85**							**100**
	86	505	517	153	**+2**	-5	+10	**102**
	87	498	495	146	**-1**	-7	+6	**102**
	88	474	497	150	**+5**	-2	+12	**107**
	89	502	493	152	**-2**	-8	+5	**105**
	90	474	474	152	**0**	-7	+7	**105**
	91	465	464	149	**0**	-7	+8	**105**
	92	474	511	149	**+8***	0	+15	**113**
	93	503	501	151	**0**	-7	+7	**112**
	94	496	479	150	**-3**	-10	+3	**108**
Farmland plots	**85**							**100**
	86	256	282	66	**+10***	0	+21	**110**
	87	298	302	67	**+1**	-7	+11	**112**
	88	309	324	72	**+5**	-4	+14	**117**
	89	334	329	80	**-2**	-9	+7	**115**
	90	294	298	75	**+1**	-8	+11	**117**
	91	286	276	72	**-4**	-13	+7	**113**
	92	262	284	65	**+8**	-2	+19	**122**
	93	285	268	67	**-6**	-16	+4	**115**
	94	253	247	65	**-2**	-12	+9	**112**
Woodland plots	**85**							**100**
	86	166	153	63	**-8**	-19	+4	**92**
	87	152	147	64	**-3**	-15	+10	**89**
	88	124	134	60	**+8**	-5	+25	**96**
	89	129	124	56	**-4**	-14	+7	**93**
	90	142	139	62	**-2**	-11	+7	**91**
	91	137	146	62	**+7**	-5	+19	**97**
	92	156	159	65	**+2**	-9	+14	**98**
	93	158	173	67	**+9**	-2	+23	**108**
	94	176	173	69	**-2**	-12	+9	**106**

3.5 Jackdaw *Corvus monedula*

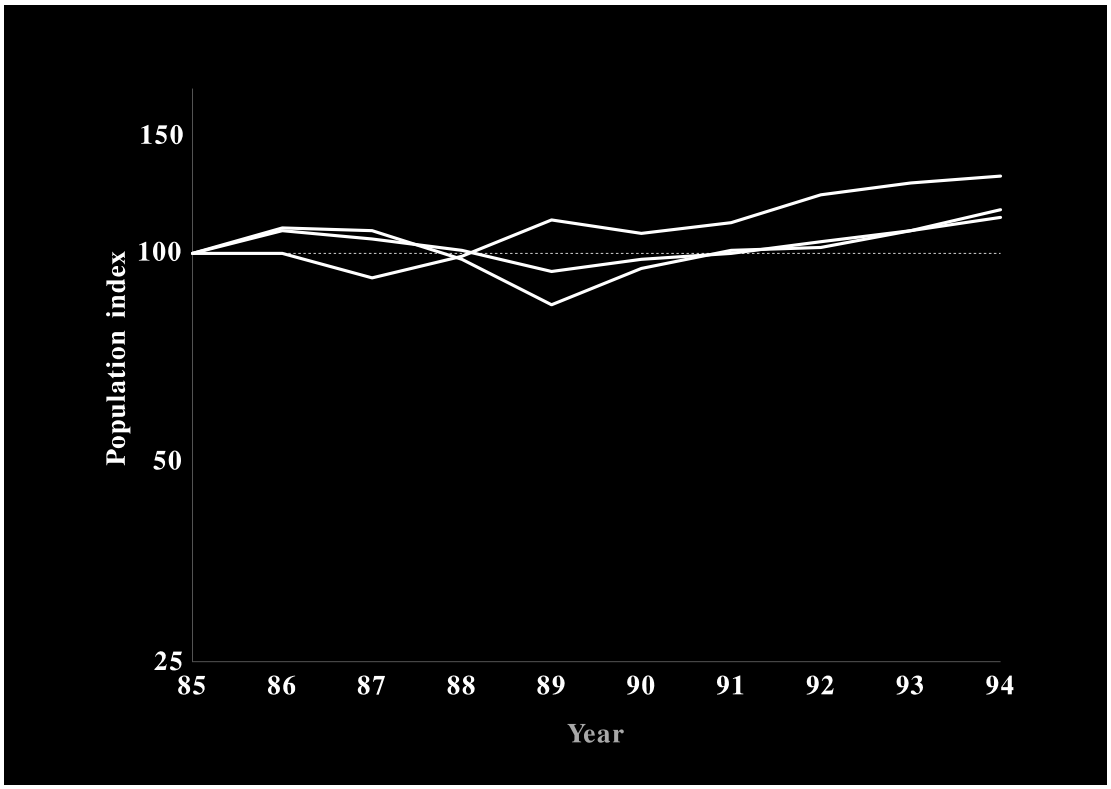

Figure 6.CBC population changes between 1985 and 1994 for Jackdaw on farmland (dotted line), in woodland (dashed line) and in all habitats combined (solid line). Index values are relative to 100 in 1985.

There has been a long-term increase in Jackdaw populations during the present century and this trend has been linked with changes in patterns of cultivation (Parslow 1973, O'Connor & Shrubb 1986). Marchant *et al*. (1990) report relative stability during the 1980s following increases both on farmland and in woodland during the 1970s. Index values during 1985-94 were stable overall and on farmland, but increased in woodland (Figure 6): however, an analysis of CBC densities during 1964-93 found Jackdaw populations to have declined in woodland during that period (Gregory & Marchant in press). This discrepancy probably relates to the difference in study periods.

Jackdaw trends varied across habitats and regions (Gregory & Marchant in press). Population gains during 1964-93 were most pronounced on grazing farms and in the north and southwest where such farms predominate. Woodland Jackdaws increased only in the north. During 1983-93, regional trends were significantly upward in Scotland and East Anglia, and downward, although based on a small sample, in Yorkshire/Humberside (Marchant in press). Previous studies have raised the importance of grassland as a feeding area for Jackdaws and also the availability of suitable nest sites (O'Connor & Shrubb 1986).

It should be stressed that the aggregated and semi-colonial nesting habit of this species makes census work problematic; in addition, their populations are concentrated in the west of Britain and often in habitats outside the scope of the CBC (Gibbons *et al*. 1993). Atlas data show a contraction of range between 1970 and 1990 (Gibbons *et al*. 1993), and the NGBC shows the number of Jackdaws killed to have fallen between 1961 and 1989 (Tapper 1992).

Population trend:Some increase recently in woodland, otherwise little recent change
Conservation status or concern: Status secure

Table 6.Population changes for Jackdaw in the UK, as measured by the Common Birds Census. The index is chained from percentage changes in the year totals of territories, drawn from paired plots surveyed similarly in the two years: the number of contributing plots is shown. Confidence limits were calculated according to the method of Baillie *et al* (1986). Statistically significant changes are marked with an asterisk.

Habitat	Year (year 2)	Year 1 total	Year 2 total	Number of plots	% change	Lower 95% c.l.	Upper 95% c.l.	Index (1985 = 100)
All habitats combined	**85**							**100**
	86	292	315	87	**+8**	-3	+21	**108**
	87	282	274	79	**-3**	-17	+12	**105**
	88	267	257	85	**-4**	-18	+16	**101**
	89	292	272	89	**-7**	-15	+2	**94**
	90	272	284	90	**+4**	-7	+18	**98**
	91	266	270	85	**+2**	-11	+16	**100**
	92	288	300	86	**+4**	-9	+19	**104**
	93	306	319	86	**+4**	-6	+16	**108**
	94	310	325	81	**+5**	-6	+18	**113**
Farmland plots	**85**							**100**
	86	178	194	45	**+9**	-5	+28	**109**
	87	191	189	43	**-1**	-20	+18	**108**
	88	183	166	47	**-9**	-26	+18	**98**
	89	185	158	51	**-15***	-25	-4	**84**
	90	156	177	52	**+13**	-1	+32	**95**
	91	148	158	45	**+7**	-6	+20	**101**
	92	169	171	44	**+1**	-16	+23	**102**
	93	197	207	44	**+5**	-8	+20	**108**
	94	183	198	43	**+8**	-5	+28	**116**
Woodland plots	**85**							**100**
	86	75	75	31	**0**	-24	+28	**100**
	87	79	73	31	**-8**	-26	+17	**92**
	88	69	74	30	**+7**	-14	+38	**99**
	89	74	84	31	**+14**	-3	+32	**112**
	90	86	82	31	**-5**	-24	+11	**107**
	91	89	92	32	**+3**	-20	+39	**111**
	92	83	91	32	**+10**	-17	+38	**122**
	93	90	94	33	**+4**	-15	+31	**127**
	94	94	96	29	**+2**	-15	+26	**130**

3.6 Rook *Corvus frugilegus*

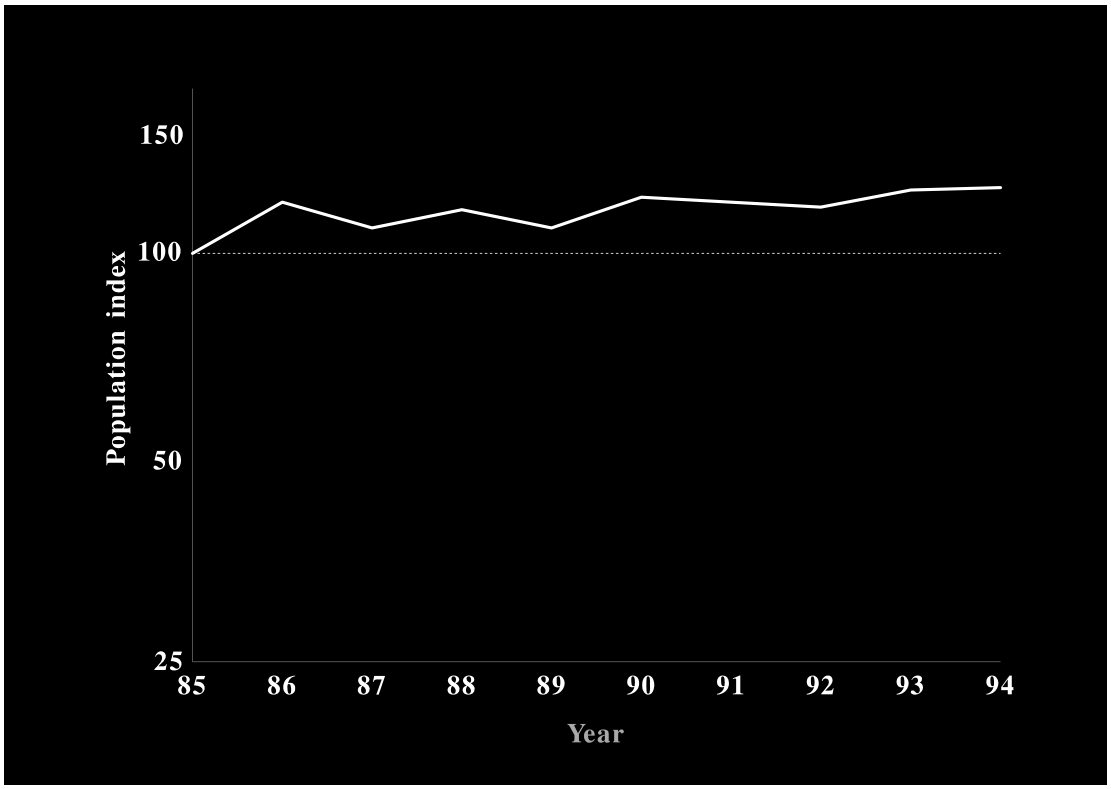

Figure 7.CBC population changes between 1985 and 1994 for Rook in all habitats combined. Index values are relative to 100 in 1985.

Rooks are recorded on most CBC plots, but only active nests are counted for monitoring purposes. Nesting occurred on around 10% of plots in 1983-88 (Marchant *et al*. 1990), not enough to maintain an adequate sample. The species has not therefore been monitored routinely by the CBC. In the absence of any other data indicating population trends during the study period, the limited data that were available from the CBC are presented. The all habitats index shows a small increase during 1985-94 (Figure 7). Samples were insufficient for separate farmland and woodland indices to be compiled.

A regional analysis during 1983-93 found a significant decrease in West Midlands, although this was based on a small sample of census plots, and a significant increase in the South East (Marchant in press).

There was a fall of 43% in Rook numbers between 1944-46 and 1975 (Sage & Vernon 1978), attributed largely to the conversion of pasture to intensive cereal farming (O'Connor & Shrubb 1986). The most recent national census of rookeries was a BTO sample survey in 1980, in which over 234,000 nests were counted. This survey found 7% more nests than in the previous census in 1975, but these were concentrated into 8% fewer rookeries (Sage & Whittington 1985). A further survey is being planned for 1996.

Population trend:Little evidence of any recent change

Conservation status or concern: Status secure

Table 7.Population changes for Rook in the UK, as measured by the Common Birds Census. The index is chained from percentage changes in the year totals of territories, drawn from paired plots surveyed similarly in the two years: the number of contributing plots is shown. Confidence limits were calculated according to the method of Baillie *et al* (1986).

Habitat	Year (year 2)	Year 1 total	Year 2 total	Number of plots	% change	Lower 95% c.l.	Upper 95% c.l.	Index (1985 = 100)
All habitats combined	**85**							**100**
	86	853	1011	22	**+19**	-7	+68	**119**
	87	882	814	19	**-8**	-33	+23	**109**
	88	694	733	16	**+6**	-15	+25	**116**
	89	983	928	23	**-6**	-22	+13	**109**
	90	836	926	23	**+11**	-27	+39	**121**
	91	869	856	23	**-2**	-12	+22	**119**
	92	778	762	22	**-2**	-10	+5	**117**
	93	851	904	27	**+6**	-6	+31	**124**
	94	698	706	27	**+1**	-11	+20	**125**

3.7Carrion Crow *Corvus corone*

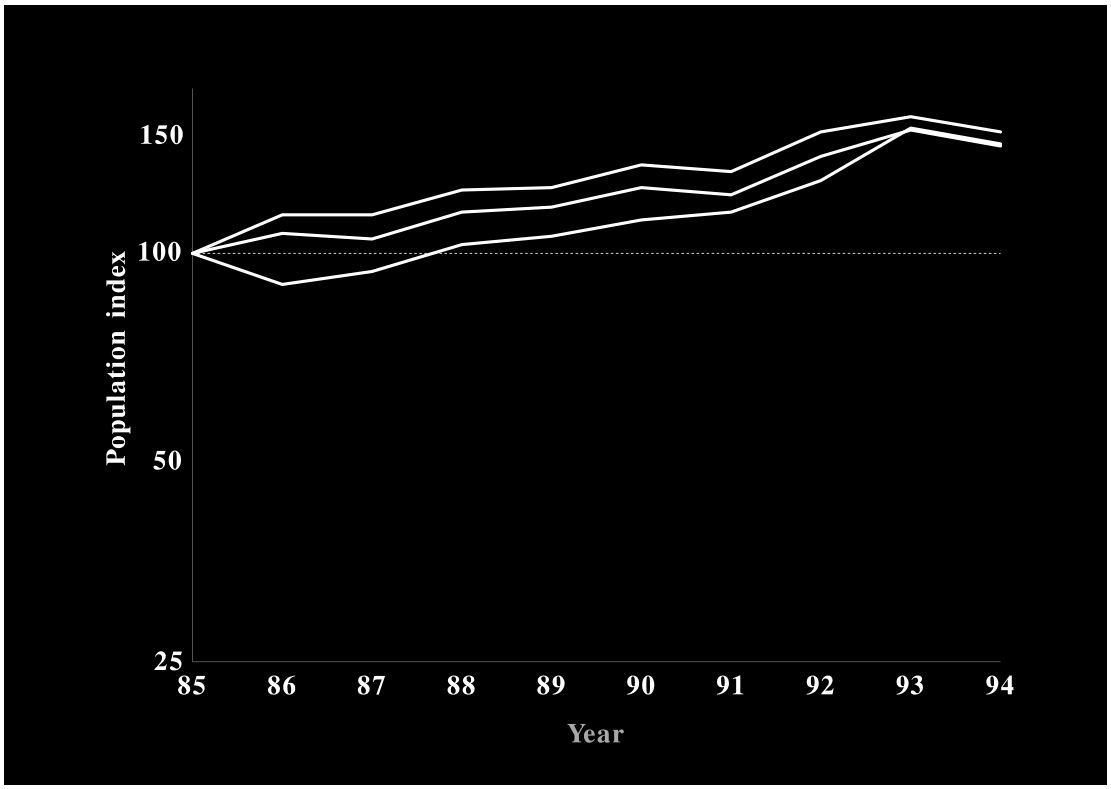

Figure 8.CBC population changes between 1985 and 1994 for Carrion Crow on farmland (dotted line), in woodland (dashed line) and in all habitats combined (solid line). Index values are relative to 100 in 1985.

Carrion Crows have increased considerably over the last fifty years, primarily as a consequence of decreased control, and the species has extended its range into suburban and urban areas (Parslow 1973, O'Connor & Shrubb 1986, Tapper 1992). Changes in Carrion Crow populations have been closely similar to those for Magpie, although increases have tended to be slightly smaller (Gregory & Marchant in press). Like Magpies, Carrion Crows have shown a general reduction in population growth from the late 1970s, but for the latter the increases on farmland and in woodland continued strongly during 1985-94 (Figure 8).

During 1983-93, increases were remarkably consistent among 11 regions of the United Kingdom (Marchant in press). Significant increases of between 4.3% and 7.2% per annum were found in five of the eight English regions, and in Scotland.

O'Connor & Shrubb (1986) suggested that the general increase density of sheep in upland areas, and consequent increase in carrion, may be responsible for the expansion of Carrion Crow and Magpie populations. They showed that Carrion Crows on CBC plots were increasing in counties dominated by cereals and tillage and were stable in sheep-rearing regions. However, Gregory & Marchant (in press) found population gains on both mixed and grazing CBC plots and only a small increase on arable plots. Comparison is difficult because O'Connor & Shrubb assigned all CBC plots in a county to the predominate farmland type in that county, and their period of study was 1962-1984 rather than 1964-93. The *New Atlas* shows population densities to be low in much of eastern England (Gibbons *et al*. 1993).
The NGBC has shown no overall change in the number of Carrion Crows killed between 1961 and 1988 (Tapper 1992). This is surprising given the general population increase and perhaps suggests a reduction in effort directed to the control of this species (Tapper 1992). Despite the introduction of Larsen traps, which are equally efficient at capturing territorial Carrion Crows

and Magpies, there has been only a small upturn in more recent bag returns (Tapper & France 1992).

CBC results refer to the species as a whole but, in practice, owing to the shortage of plots in northwest Scotland and in Northern Ireland, very few Hooded Crows *Corvus corone cornix* or intermediates were censused. There are no measures of population change among such birds, but their breeding range contracted further to the north and west during the twenty years between the two BTO breeding bird atlases (Gibbons *et al*. 1993).

Population trend:Continued strong increase, perhaps less steep than formerly

Conservation status or concern: Status secure

Table 8.Population changes for Carrion Crow in the UK, as measured by the Common Birds Census. The index is chained from percentage changes in the year totals of territories, drawn from paired plots surveyed similarly in the two years: the number of contributing plots is shown. Confidence limits were calculated according to the method of Baillie *et al* (1986). Statistically significant changes are marked with an asterisk.

Habitat	Year (year 2)	Year 1 total	Year 2 total	Number of plots	% change	Lower 95% c.l.	Upper 95% c.l.	Index (1985 = 100)
All habitats combined	**85**							**100**
	86	383	408	153	**+7**	-3	+17	**107**
	87	412	407	153	**-1**	-9	+7	**105**
	88	380	416	154	**+9***	+2	+18	**115**
	89	429	434	157	**+1**	-6	+9	**117**
	90	410	438	153	**+7**	-1	+15	**125**
	91	430	423	151	**-2**	-9	+6	**122**
	92	425	484	158	**+14***	+5	+24	**139**
	93	501	546	154	**+9***	+1	+18	**152**
	94	493	467	154	**-5**	-11	+1	**144**
Farmland plots	**85**							**100**
	86	215	246	67	**+14***	+1	+31	**114**
	87	268	267	72	**0**	-10	+10	**114**
	88	258	281	75	**+9**	0	+20	**124**
	89	292	294	80	**+1**	-9	+11	**125**
	90	268	290	74	**+8**	-2	+18	**135**
	91	284	277	69	**-2**	-12	+8	**132**
	92	265	304	69	**+15***	+2	+29	**151**
	93	327	344	66	**+5**	-6	+16	**159**
	94	298	282	66	**-5**	-12	+3	**151**
Woodland plots	**85**							**100**
	86	113	102	62	**-10**	-21	+3	**90**
	87	108	113	67	**+5**	-10	+21	**94**
	88	97	106	62	**+9**	-5	+26	**103**
	89	107	110	61	**+3**	-10	+19	**106**
	90	115	121	64	**+5**	-11	+22	**112**
	91	116	119	66	**+3**	-13	+18	**115**
	92	124	139	70	**+12**	-3	+28	**128**
	93	142	169	70	**+19***	+4	+38	**153**
	94	160	152	69	**-5**	-14	+5	**145**

3.8 Starling *Sturnus vulgaris*

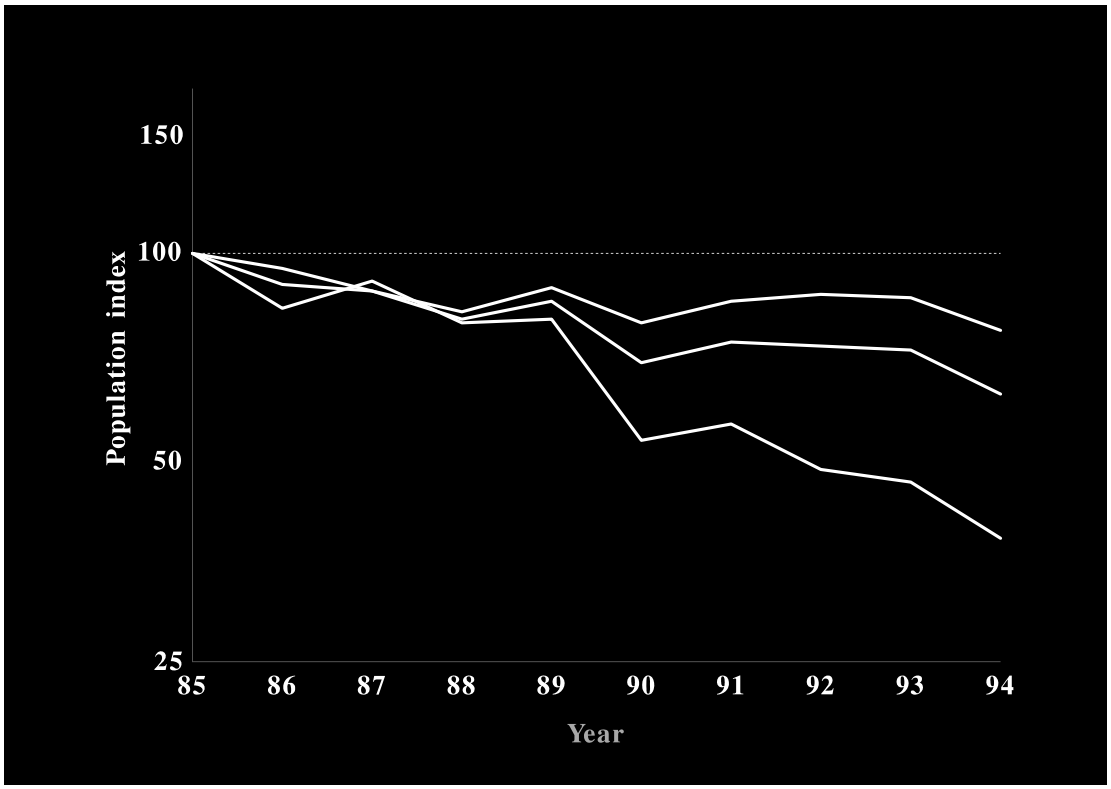

Figure 9.CBC population changes between 1985 and 1994 for Starling on farmland (dotted line), in woodland (dashed line) and in all habitats combined (solid line). Index values are relative to 100 in 1985.

There were decreases in both farmland and woodland during 1985-94, that in woodland being considerably steeper (Figure 9). These trends have been evident since the beginning of the 1980s (Marchant *et al*. 1990). Overall trends were strongly downward in both CBC habitats in the late 1960s and again during the 1980s, in line with decreases in Scandinavia (Marchant *et al*. 1990).

During 1983-93, populations declined in the United Kingdom as a whole and also separately in four regions constituting the English south and east: a significant increase was recorded in Yorkshire/Humberside, although this was based on a small sample, and elsewhere in the north and west of the UK there was little evidence of change (Marchant in press).

The CBC measures Starling breeding population trends and densities on farmland and in woodland. Densities and trends are unknown for the urban and suburban sections of the population, where breeding densities are believed to be substantially higher.

Population trend:Continuing decline since early 1980s, severe decline in woodland

Conservation status or concern: ***Conservation vigilance required***

Table 9.Population changes for Starling in the UK, as measured by the Common Birds Census. The index is chained from percentage changes in the year totals of territories, drawn from paired plots surveyed similarly in the two years: the number of contributing plots is shown. Confidence limits were calculated according to the method of Baillie *et al* (1986). Statistically significant changes are marked with an asterisk.

Habitat	Year (year 2)	Year 1 total	Year 2 total	Number of plots	% change	Lower 95% c.l.	Upper 95% c.l.	Index (1985 = 100)
All habitats combined	**85**							**100**
	86	747	672	106	**-10**	-21	+3	**90**
	87	679	663	111	**-2**	-11	+7	**88**
	88	653	592	113	**-9***	-17	-2	**80**
	89	602	639	112	**+6**	-6	+19	**85**
	90	645	525	109	**-19***	-27	-9	**69**
	91	531	571	104	**+8**	-5	+24	**74**
	92	648	640	114	**-1**	-14	+11	**73**
	93	548	541	104	**-1**	-11	+10	**72**
	94	521	446	100	**-14***	-22	-7	**62**
Farmland plots	**85**							**100**
	86	350	333	48	**-5**	-19	+14	**95**
	87	381	352	60	**-8**	-20	+6	**88**
	88	419	389	67	**-7**	-16	+3	**82**
	89	395	429	73	**+9**	-8	+24	**89**
	90	387	344	65	**-11**	-22	+2	**79**
	91	329	355	58	**+8**	-9	+33	**85**
	92	398	409	62	**+3**	-15	+17	**87**
	93	365	360	57	**-1**	-14	+14	**86**
	94	335	299	54	**-11**	-19	+1	**77**
Woodland plots	**85**							**100**
	86	264	220	37	**-17**	-37	+7	**83**
	87	238	260	37	**+9**	-3	+30	**91**
	88	191	166	31	**-13***	-31	-1	**79**
	89	176	178	27	**+1**	-16	+34	**80**
	90	223	147	30	**-34***	-51	-20	**53**
	91	156	166	32	**+6**	-12	+42	**56**
	92	184	158	34	**-14**	-30	+6	**48**
	93	136	131	32	**-4**	-22	+15	**46**
	94	125	103	30	**-18***	-35	-1	**38**

3.9 House Sparrow *Passer domesticus*

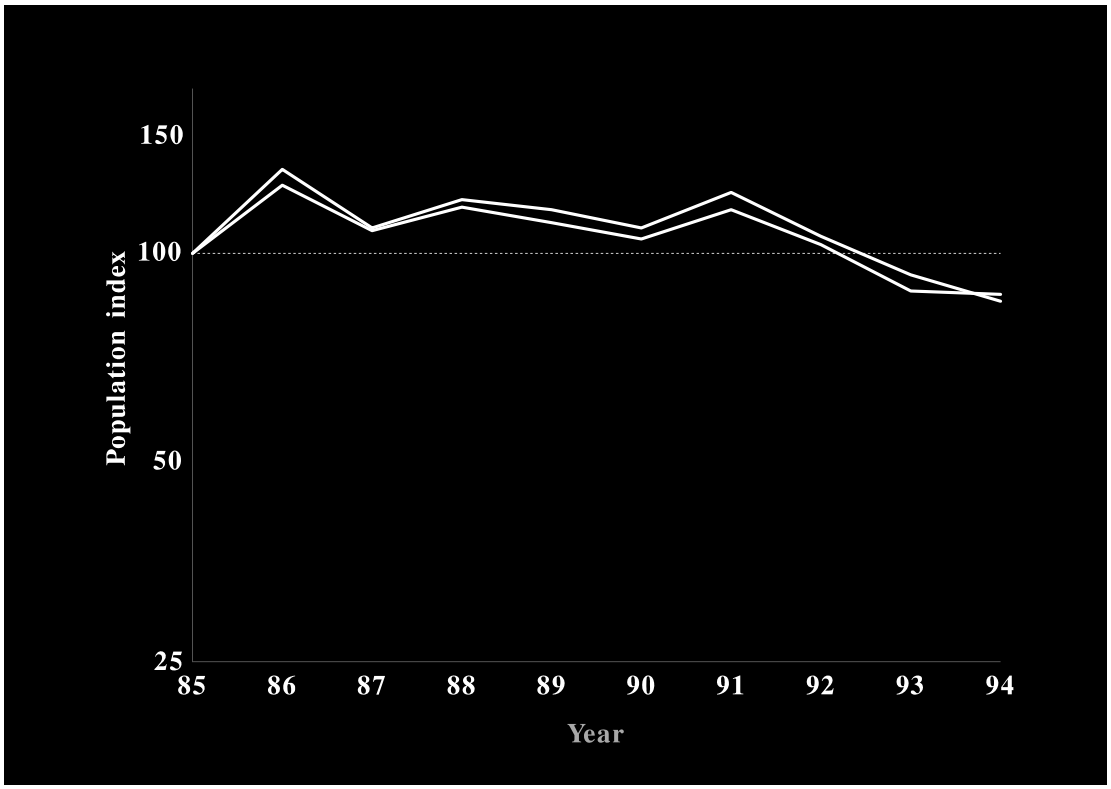

Figure 10.CBC population changes between 1985 and 1994 for House Sparrow on farmland (dotted line) and in all habitats combined (solid line). Index values are relative to 100 in 1985.

The CBC indices for House Sparrow were drawn almost entirely from farmland plots, where the species nests mostly either in farm buildings or in adjoining houses and gardens. The large urban and suburban sections of the population are not monitored, and it is not known how well CBC results indicate changes in total population sizes. During 1985-94, there was some decrease in the farmland data and in all habitats combined (Figure 10, Table 10). Data from woodland are extremely sparse and are therefore not presented.

Regionally, the only statistically significant trends during 1983-93 were decreases in the East Midlands and South West (Marchant in press).

The overall results of the CBC show a 32% decline in numbers between 1976 and 1992 (Balmer & Marchant 1993). The *1988-91 Atlas* revealed that there had been some range contraction since 1968-72 (Gibbons *et al*. 1993), and there were other more subjective indications of population decrease during this period (Balmer & Marchant 1993). The decline in the House Sparrow population appears to be part of a general decline among a suite of seed-eating birds of farmland, particularly since the late 1970s (Fuller *et al*. in press). The closely related Tree Sparrow *Passer montanus* is among this group of birds and has declined by 85% on farmland between 1968 and 1991.

Population trend:Continuing decline since late 1970s

Conservation status or concern: ***Conservation vigilance required***

Table 10.Population changes for House Sparrow in the UK, as measured by the Common Birds Census. The index is chained from percentage changes in the year totals of territories, drawn from paired plots surveyed similarly in the two years: the number of contributing plots is shown. Confidence limits were calculated according to the method of Baillie *et al* (1986). Statistically significant changes are marked with an asterisk.

Habitat	Year (year 2)	Year 1 total	Year 2 total	Number of plots	% change	Lower 95% c.l.	Upper 95% c.l.	Index (1985 = 100)
All habitats combined	**85**							**100**
	86	248	312	42	**+26**	-10	+59	**126**
	87	255	218	45	**-15**	-34	+17	**108**
	88	234	255	52	**+9**	-9	+30	**117**
	89	317	299	61	**-6**	-20	+10	**111**
	90	304	290	60	**-5**	-18	+11	**105**
	91	247	271	55	**+10**	-7	+28	**116**
	92	337	301	61	**-11**	-25	+4	**103**
	93	308	262	57	**-15***	-27	-3	**88**
	94	296	292	60	**-1**	-17	+30	**87**
Farmland plots	**85**							**100**
	86	200	266	25	**+33**	-9	+78	**133**
	87	224	184	30	**-18**	-39	+18	**109**
	88	196	215	36	**+10**	-11	+34	**120**
	89	281	271	47	**-4**	-19	+14	**116**
	90	272	257	45	**-6**	-20	+12	**109**
	91	213	240	40	**+13**	-6	+34	**123**
	92	284	244	43	**-14**	-29	+2	**106**
	93	258	227	40	**-12**	-26	+2	**93**
	94	255	233	43	**-9**	-23	+24	**85**

3.10 Overall trends of opportunistic species in the United Kingdom

To provide an overview of trends in the species under discussion, we fitted quadratic regressions to the trends of log index against year, and calculated the values predicted by these equations for the first and last of the ten years of the study. The differences between these predicted indices at the start and end of each run of index values are shown in Table 11.

Table 11. Overall trends during 1985-94, as measured by the Common Birds Census. The figures tabulated are the percentage differences between index values for 1985 and 1994, predicted from quadratic regressions.

Species	All habitats	Farmland	Woodland
Woodpigeon	+43	+53	+30
Collared Dove	+40	+46	.
Jay	-15	-20	-17
Magpie	+10	+10	+12
Jackdaw	+6	+7	+36
Rook	+17	.	.
Carrion Crow	+50	+52	+63
Starling	-33	-15	-61
House Sparrow	-20	-20	.

We have shown substantial increases in population levels for Carrion Crow, Woodpigeon and Collared Dove within this ten-year period of the CBC data set. While the overall pattern was of strong increase, Collared Dove numbers decreased in woodland. Only a small increase was found for Magpie, a species whose population size was until recently expanding rapidly. Rook and Jackdaw also increased, the latter particularly in woodland habitats.

Starling was the species most strongly in decline, especially in woodland where 61% of the 1985 population had been lost by 1994. On farmland its rate of decline was much lower, and shallower than was found for Jay and for House Sparrow. These two species were also in overall decline. For House Sparrows, the apparently stronger decline in woodland habitats may have been an artefact of exceptionally wide confidence intervals for that habitat (Table 10).

For Jay, Magpie, Jackdaw and Carrion Crow, variation in trends across habitats and regions has been analysed by Gregory & Marchant (in press) for the period 1983-93.

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