Index of Abundance for Scottish Terrestrial Breeding Birds, 1994 to 2012
An Official Statistics Publication for Scotland

Scotland's terrestrial breeding birds include those commonly associated with woodland, farmland and upland habitats. Some are found in one particular habitat, for example great-spotted woodpeckers are typical woodland birds. Others use a wider range of habitats such as dunnocks which can be found in woodland and farmland. Birds can respond relatively quickly to variation in habitat extent and condition, through changes in breeding output, survival or dispersal. Since most are relatively easy to identify and count, are widespread and abundant, they are used as indicators of environmental change.

Evidence

In Scotland, terrestrial breeding birds are monitored primarily through the Breeding Bird Survey (BBS). Volunteers visit randomly located 1km survey squares twice in the breeding season (April to July). The squares are representative of farmland, woodland and upland habitats. Ten of the 66 species included here are assessed using targeted surveys, as they are either too scarce for reliable abundance estimation by BBS or are better monitored by specialised surveys.

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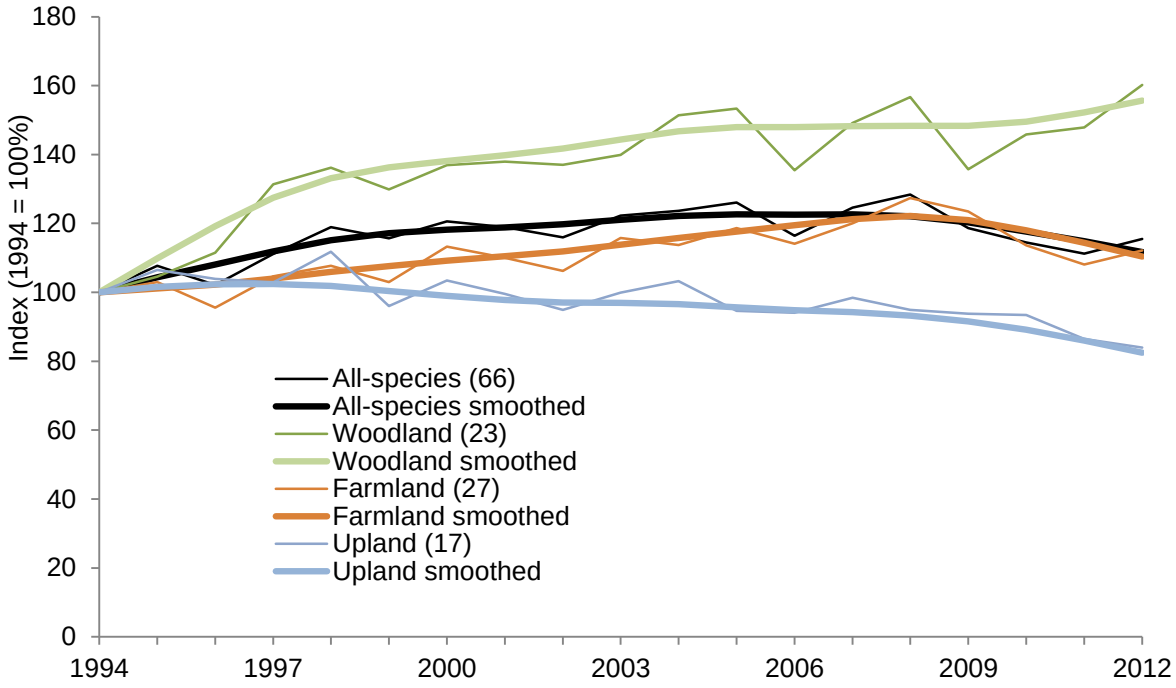
Breeding Bird Survey and targeted survey scheme data for 66 breeding bird species



Figures in brackets show the number of species in each category – a species may occur in more than one category

Assessment

Since the start of the time series in 1994 to the most recent estimate in 2012:

- 35 of the 66 bird species increased in abundance; the all-species (smoothed) index increased by 12%;
- The smoothed woodland bird index increased by 56% overall;
- The smoothed farmland bird index increased by 10% overall;
- The smoothed upland bird index decreased by 18% overall;
- The unsmoothed data show that, between 2011 and 2012 the woodland index increased by 12% and the all-species index increased by 4%, whereas the upland bird index and the farmland index showed no significant change over this period.

All species change (2011 – 12)	**Increased**
All species long-term trend	**Increased**

Commentary

Since 1994 the smoothed all-species index has increased. In 2012 it was 12% above the baseline. Farmland and woodland indices also showed increases since 1994; in contrast upland birds decreased. The change between 2011 and 2012 was assessed using the unsmoothed indices. The woodland and all-species unsmoothed indices showed modest increases between 2011 and 2012. Farmland and upland birds showed no change.

In this commentary, long-term refers to 1994 to 2012; short-term is the change between 2011 and 2012. For a number of species it is unclear what the main drivers of population change are. For others, the available evidence is provided to help understand reasons for change. Bird populations are affected by the environmental conditions in all parts of their natural range; a migratory bird may be affected by the conditions in Scotland, *en route* to the migratory destination, or the final destination. The trends for individual species (long-term and short-term) are assessed using the unsmoothed trend. Due to the variability in the individual species trends, a threshold for increasing or decreasing is taken to be a long-term or short-term change of 5% or more. Individual species trends are shown in Table 1.

Woodland Birds

Woodland birds have shown the largest increases, both in terms of the combined trend and individual species trends.

Species that increased over the long-term include the migrants – chiffchaff, blackcap and willow warbler. Chiffchaffs have shown the biggest increase. The reasons for the increase are not clear but may be linked to the wintering area (Amar *et al*., 2006). Blackcaps have steadily increased throughout Europe (Baillie *et al*., 2013). Willow warbler trends vary regionally: Morrison *et al*. (2010) observed that there is a large-scale spatial gradient to the trends, which may be due to changing climatic conditions, timing of migration and local-scale changes to habitats. Resident birds that increased include great-spotted woodpecker, great tit and goldcrest. Great-spotted woodpecker increased throughout Britain, in part due to increased nestling survival (Baillie *et al*., 2013). Great tit and goldcrest increases may be due to improved winter conditions over the long-term (Baillie *et al*., 2013).

Only cuckoo and capercaillie have shown sustained long-term declines. Capercaillie declines have been linked to losses of suitable habitat, predation, weather conditions during chick rearing, and disturbance. Capercaillie is a species for which targeted action has been undertaken, such as through the Species Action Framework.[1]

Short-term trends reveal notable increases for goldcrest, dunnock, blackbird, wren, robin, mistle thrush and song thrush. Some of this may be a recovery from the harsh winters of 2009 and 2010 (Risely *et al*., 2013). Others declined, including bullfinch, tree pipit, willow warbler and blue tit. The reasons for these declines are not clear.

Farmland Birds

The combined trend for farmland birds shows an overall increase. Individual species trends reveal a mix of increasing and decreasing populations.

Birds that increased in the long term include some that specialise on farmland seeds, in particular goldfinch and yellowhammer. Goldfinch populations increased since 1994; reasons contributing to this include exploiting other food sources, such as more regular feeding in gardens (Baillie *et al*., 2013), resulting in an improved annual survival. Migrants which have increased include whitethroat and sedge warbler. Studies have shown that population changes

[1] http://www.snh.gov.uk/protecting-scotlands-nature/species-action-framework/species-action-list/capercaillie/update/

of these two bird species are linked to the conditions they experience on their African wintering grounds (Baillie *et al*., 2013).

Species that decreased in the long-term include lapwing, kestrel and greenfinch. Lapwing populations have declined steadily, in part due to land use change and predation (see review by Foster *et al*., 2013). Kestrel populations have shown similarly large declines; reasons for this are not entirely clear, although a study in western France specifically identified negative associations between agricultural practices and kestrel abundance (Butet *et al*., 2010). Greenfinch declines have been linked with the widespread outbreak of trichomonosis (Lawson *et al*., 2012).

Short-term trends show a mixed picture, with increases noted for goldfinch, rook and kestrel. Studies have shown that kestrel numbers are affected by the abundance of voles (Riddle, 2011), which may account for the increase from 2011 to 2012.

Upland Birds

The combined trend for upland birds shows a gradual long-term decline. Trends for the individual species are mixed: ten species declined by 10 percentage points or more and four increased.

Long-term increases include raven, cuckoo and snipe. Ravens have increased throughout Europe, possibly as a result of an increase in breeding success (Baillie *et al*., 2013). The trend for cuckoo in the uplands differs from woodland; Newson *et al*. (2009) suggest this may be due to differences between the habitats and host birds.

Long-term decreases include curlew, dotterel and common sandpiper. Curlew declines are likely to be linked to land use, with predation a likely mechanism (Douglas *et al*., 2013). Dotterel are an alpine specialist, only found on a few mountain tops. The reasons for the decline include changes on their African wintering grounds and changes in distributions of breeding birds (Whitfield, 2002). Common sandpiper have declined across their range (Baillie *et al*., 2013); poor breeding success and survival are possible factors.

Short-term trends show considerable variation between the species, with increases for meadow pipit, curlew and golden plover. A study by Pearce-Higgins *et al*. (2010) has shown a link between the abundance of cranefly larvae and golden plover populations.

Birds not specific to any of the habitats

Eight bird species are not included in the habitat specific trends, either because they do not show a strong association to that habitat, or insufficient data were available to calculate a habitat specific trend.

Of these, long-term increases have been noted for house martin, house sparrow and grey heron.

Long-term decreases were observed for grey wagtail, collared dove and swift. Swift populations have the largest decline of any bird species included here. The decline may be related to the availability of suitable nesting areas (Baillie *et al*., 2013).

Source data and updates

In this update dotterel has been added to the indicator; this is an upland wading bird which is surveyed periodically and new information has become available. Data for 56 of the 66 species come from the Breeding Bird Survey (BBS) run jointly by British Trust for Ornithology (BTO), Joint Nature Conservation Committee (JNCC) and Royal Society for the Protection of Birds (RSPB) (View map of BBS sites at http://blx1.bto.org/bbs-

results/results/cov_maps/bbscoverage-9999.html). The data for BBS consist of annual counts made over a period of years at a series of sites.

Trends for common sandpiper and dipper are derived from the BTO Waterways Bird Survey and the Waterways Breeding Bird Survey. Grey heron trends are derived from the Heronries Census. Trends for seven species (golden eagle, hen harrier, peregrine, dotterel, corncrake, black grouse and capercaillie) are estimated from single-species surveys carried out periodically, during the period 1994 to 2012 as part of the SCARABBS (Statutory Conservation Agency/RSPB Annual Breeding Bird Scheme) programme.

Generalised Linear Models were used to generate trends. To prevent short-term population variability and statistical error having an undue influence, trends were smoothed and long term trends assessed using techniques recommended by Fewster *et al*. (2000). The unsmoothed indices were used to assess the significance of recent changes. Details of the methods used to calculate the indices are available from http://www.bto.org/birdtrends2010/methodology.htm.

The index will be updated next in November 2014.

Official Statistics are produced by professionally independent statistical staff in accordance with the Code of Practice for Official Statistics.

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Table 1. Percentage changes in abundance for the Scottish Terrestrial Breeding Birds, 1994-2012 and 2011-2012, species listed in order of overall change 1994 to 2012.

Summarised measures of change (over the entire time period and the most recent year interval) in the unsmoothed trends for individual species and their habitat associations from 1994 to 2012. A blank entry denotes that the species did not show a strong association to that habitat, or that insufficient data were available to calculate a habitat-specific trend.

	All species		Woodland		Farmland		Upland	
Species name	94-12	11-12	94-12	11-12	94-12	11-12	94-12	11-12
Chiffchaff	586	7	586	7				
Great Spotted Woodpecker	470	19	470	19				
Blackcap	323	7	364	13				
House Martin	288	44						
Goldfinch	210	17			376	31		
Corncrake	171	1			171	1		
Siskin	121	17	121	17				
Bullfinch	106	-33	106	-31				
Great Tit	94	10	101	19	151	15		
Lesser Redpoll	82	8	82	8				
Tree Pipit	68	-19	68	-19				
Whitethroat	67	-44			67	-44		
Willow Warbler	64	-12	64	-12				
Goldcrest	60	29	60	29				
Magpie	58	-9			45	6		
Jackdaw	51	15			40	24		
Raven	51	-25					51	-25
Dunnock	48	5	94	33	12	17		
Treecreeper	46	-10	46	-10				
House Sparrow	44	16						
Yellowhammer	40	-2			40	-2		
Buzzard	36	-4	28	13	67	17		
Grey Heron	34	1						
Sedge Warbler	31	-14			31	-14		
Blackbird	26	15	13	24	38	14		
Coal Tit	25	1	25	1				
Cuckoo	25	4	-18	3			66	14
Swallow	23	10			23	10		
Wren	20	64	20	64				
Blue Tit	18	-9	7	-15	29	-13		
Chaffinch	15	-1	8	-7	10	-7		
Stonechat	14	185						
Snipe	12	19					12	19
Willow/Red Grouse	10	-4					10	-4
Woodpigeon	10	18			-3	1		
Rook	4	110			4	110		
Golden Eagle	4	0					4	0
Robin	3	28	23	35				
Pied Wagtail	3	20			3	20		
Hen Harrier	1	-4					1	-4

Species name	All species		Woodland		Farmland		Upland	
	94-12	11-12	94-12	11-12	94-12	11-12	94-12	11-12
Reed Bunting	1	1			1	1		
Mistle Thrush	-1	33	-1	33				
Mallard	-2	-12						
Wheatear	-3	-19					-3	-19
Grey Wagtail	-9	100						
Golden Plover	-12	12					-12	12
Song Thrush	-13	8	0	25	9	11		
Carrion Crow	-16	-28			-11	-30		
Collared Dove	-16	-6						
Starling	-16	20			-4	20		
Meadow Pipit	-16	15					-16	15
Peregrine	-19	-1					-19	-1
Greenfinch	-23	-7			-19	-4		
Oystercatcher	-27	23			-27	23		
Dipper	-28	-10					-28	-10
Skylark	-33	-6			-48	-5	-16	1
Hooded Crow	-38	-16					-38	-16
Common Sandpiper	-40	-20					-40	-20
Linnet	-42	-44			-42	-44		
Black Grouse	-43	-3					-43	-3
Capercaillie	-45	-8	-45	-8				
Curlew	-53	14					-53	14
Dotterel	-54	-6					-54	-6
Kestrel	-62	33			-62	33		
Lapwing	-63	5			-63	5		
Swift	-77	-41						