

## Index of Abundance for Scottish Terrestrial Breeding Birds, 1994 to 2013

An Official Statistics Publication for Scotland

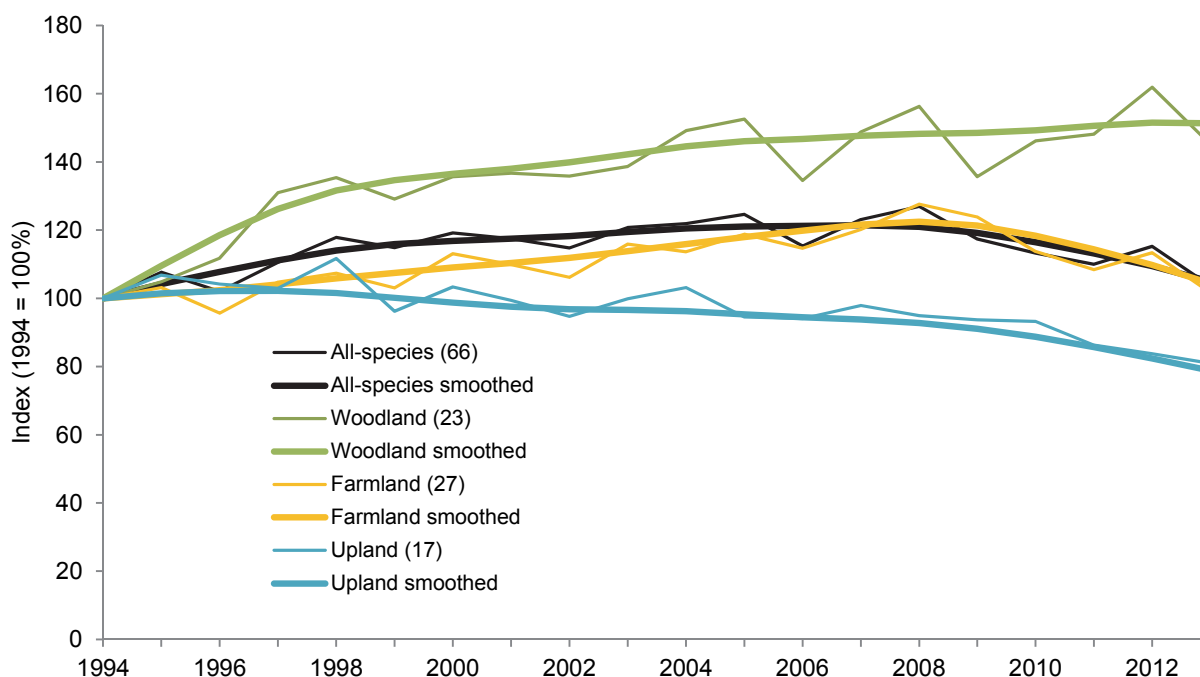
Scotland's terrestrial breeding birds include those commonly associated with woodland, farmland and upland habitats. Some are found in one particular habitat, for example great-spotted woodpeckers are typical woodland birds. Others use a wider range of habitats such as dunnocks which can be found in woodland and farmland. Birds can respond relatively quickly to variation in habitat extent and condition through changes in breeding success, survival or dispersal. Since most are relatively easy to identify and count, and 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 the 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 2013:

- 33 of the 66 bird species increased in abundance; the all-species (smoothed) index showed a steady increase up to mid-2000s but has declined since. There is no significant difference between 1994 and 2013;
- The smoothed woodland bird index increased significantly by 51% overall;
- The smoothed farmland bird index showed a steady increase up to the late-2000s but has declined since, such that there is no significant difference between 1994 and 2013;
- The smoothed upland bird index decreased significantly by 21% overall;
- The unsmoothed data show that, between 2012 and 2013, the farmland, woodland and all species indices all decreased by 10% over this period. The upland bird index showed no significant change over this period.

<b>All species change (2012 – 13)</b>	<b>Decreased</b>
<b>All species long-term trend</b>	<b>Stable</b>

## Commentary

Since 1994 the smoothed all-species index steadily increased to a maximum in 2007. In 2013 it stood at 5% above the baseline, but 14% below the 2007 figure. The farmland, woodland and all-species unsmoothed indices all showed decreases between 2012 and 2013. The reasons for these declines may be partly attributed to weather conditions leading to poor breeding success in 2012<sup>1</sup>. The unsmoothed upland index had no significant change over the same period.

In this commentary, long-term refers to 1994 to 2013 and short-term refers to the change between 2012 and 2013. For a number of species it is unclear what the main drivers of population change are, especially for short-term changes. For others, 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; for example, a migratory bird may be affected by the conditions in Scotland, *en route* to the migratory destination, or at 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 an increase or decrease 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 over the long-term, both in terms of the combined trend and individual species trends.

Species that increased over the long-term include 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 improved conditions in the wintering areas (Amar *et al.*, 2006). Blackcaps have steadily increased throughout Europe (Baillie *et al.*, 2014). 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 and great tit. Great-spotted woodpeckers have increased throughout Britain, in part due to increased breeding success whereas great tit increases may be due to improved winter survival (Baillie *et al.*, 2014).

Capercaillie and mistle thrush 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.<sup>2</sup>

Short-term trends reveal decreases for bullfinch, siskin, lesser redpoll, blackcap, goldcrest and coal tit. Increases were noted for cuckoo, tree pipit and great-spotted woodpecker. Inter-annual changes in the fortunes of woodland bird species may be reflective of changes in food supply. Watson *et al.* (2009) highlighted that species that feed largely on conifer seeds track the considerable variations in the seed crop; beech mast and birch seed are also important.

### Farmland Birds

The combined trend for farmland birds shows an increase followed by a decrease over the long-term. Individual species trends reveal a mix of increasing and decreasing populations.

Birds that increased in the long-term include goldfinch, corncrake, whitethroat and species that occupy the wood and edge habitats of farmland (e.g. blackbird and great tit). Goldfinch numbers have increased since 1994; attributed partly to exploiting other food sources, such as more regular feeding in gardens (Baillie *et al.*, 2014), resulting in an improved annual survival. Migratory birds such as whitethroat and sedge warbler are currently increasing following earlier population crashes as a result of severe drought in their wintering grounds in the Sahel region of Africa (Baillie & Peach, 1992).

<sup>1</sup> <http://www.bto.org/volunteer-surveys/ringing/surveys/ces/ces-results/preliminary-ces-results/2012>

<sup>2</sup> <http://www.snh.gov.uk/protecting-scotlands-nature/species-action-framework/species-action-list/capercaillie/update/>

Species that decreased in the long-term include lapwing, greenfinch, linnet, skylark and kestrel. The kestrel continues to show the greatest overall decline of any index species since 1994. The causes are unknown, but a study in western France identified negative associations with agricultural intensification (Butet *et al.*, 2010). Farmland birds are known to have suffered in recent decades from many aspects of agricultural intensification (Chamberlain *et al.*, 2000; Newton, 2004) including drainage of wetlands, autumn sowing of cereals, and increased use of fertilizers and pesticides. For linnet, lapwing and skylark, negative impacts appear to have been strongest on breeding performance (e.g. Siriwardena *et al.*, 2000). Greenfinch declines have been linked with the widespread outbreak of trichomonosis that started in 2005 (Lawson *et al.*, 2012).

Short-term trends show a mixed picture with increases noted for several species including reed bunting, carrion crow and lapwing between 2012 and 2013. Several species showed declines, including buzzard, goldfinch, greenfinch, jackdaw, rook and corncrake.

### ***Upland Birds***

The combined trend for upland birds shows a gradual long-term decline. Trends for the individual species are mixed: 12 declined by 10% or more and three increased over the long-term.

Long-term increases were noted for raven, cuckoo and snipe. Ravens have increased throughout Europe, possibly as a result of an increase in breeding success (Baillie *et al.*, 2014). The trend for cuckoo in the uplands differs from woodland, but the reasons for this are not clear. Douglas *et al.* (2010) largely ruled out the influence of host species on cuckoo trends, which suggests that summer food availability or differences in migration or wintering areas play a role.

Species that have decreased in the long term include curlew, dotterel and common sandpiper. Curlew declines are likely to be linked to land use, with predation a likely mechanism (Douglas *et al.*, 2014). 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.*, 2014); poor breeding success and over-winter survival are possible factors.

Short-term trends reveal decreases for a range of birds including hooded crow, golden plover and red grouse. Three of the 17 upland species (cuckoo, raven and common sandpiper) increased between 2012 and 2013. A study by Pearce-Higgins *et al.* (2010) has shown a link between the abundance of crane fly 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 any of the habitats reported, or insufficient data were available to calculate a habitat specific trend.

Of these, long-term increases have been noted for grey heron, house martin and house sparrow, which for the latter two species contrast with declining populations in England.

Long-term decreases were observed for mallard, stonechat, grey wagtail and swift. Results from BBS surveys elsewhere in the UK, show that swift populations have suffered steep declines. The decline may be related to the availability of suitable nest sites on buildings (Baillie *et al.*, 2014) but a reduction in flying insects may also play a role. Stonechat populations are known to be vulnerable to severe winters and numbers in Scotland have plummeted in the past five years following a decade of increase.

## Source data and updates

Data for 56 of the 66 species come from the British Trust for Ornithology (BTO), Joint Nature Conservation Committee (JNCC) and Royal Society for the Protection of Birds (RSPB) Breeding Bird Survey (BBS) (View map of BBS sites at [http://blx1.bto.org/bbs-results/results/cov\\_maps/bbscoverage-9999.html](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. 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 smoothed indices were used to assess the significance of long-term changes and the unsmoothed indices were used to assess the significance of short-term changes. Details of the methods used to calculate the indices are available from <http://www.bto.org/birdtrends2010/methodology.htm>.

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 2016 as part of the SCARABBS (Statutory Conservation Agency/RSPB Annual Breeding Bird Scheme) programme.

Results for the UK are available from <https://www.gov.uk/government/statistics/wild-bird-populations-in-the-uk>

The index will be next updated in November 2015.

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, 1994-2013 and 2012-2013, species listed in order of overall change 1994 to 2013.**

Summarised unsmoothed trends for individual species and their habitat associations from 1994 to 2013, and the most recent year of change. 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.

Species name	All species		Woodland		Farmland		Upland	
	94-13	12-13	94-13	12-13	94-13	12-13	94-13	12-13
Great Spotted Woodpecker	563	10	563	10				
Chiffchaff	535	-7	535	-7				
Blackcap	243	-30	254	-25				
House Martin	147	-38						
Goldfinch	129	-28			204	-36		
Corncrake	110	-24			110	-24		
Raven	107	35					107	35
Great Tit	94	3	104	1	137	-8		
Tree Pipit	85	16	85	16				
Whitethroat	80	3			80	3		
Dunnock	58	3	101	1	18	1		
Treecreeper	49	-11	49	-11				
Cuckoo	46	16	5	27			105	28
Siskin	46	-35	46	-35				
Bullfinch	36	-37	36	-37				
Willow Warbler	36	-16	36	-16				
House Sparrow	35	-7						
Magpie	35	-14			31	-11		
Yellowhammer	30	-8			30	-8		
Wren	29	4	29	4				
Goldcrest	29	-21	29	-21				
Buzzard	22	-13	8	-15	8	-37		
Blackbird	22	-3	20	7	36	-2		
Grey Heron	18	-9						
Sedge Warbler	17	-13			17	-13		
Snipe	15	2					15	2
Reed Bunting	14	24			14	24		
Blue Tit	11	-11	-2	-10	20	-9		
Swallow	10	-12			10	-12		
Chaffinch	8	-6	10	2	12	0		
Robin	8	3	33	8				
Carrion Crow	5	21			22	36		
Jackdaw	5	-27			4	-24		
Golden Eagle	4	0					4	0
Collared Dove	2	15						
Woodpigeon	1	-7			-2	2		
Lesser Redpoll	-1	-43	-1	-43				
Pied Wagtail	-1	-7			-1	-7		
Song Thrush	-3	10	-3	-2	13	2		
Hen Harrier	-3	-4					-3	-4
Coal Tit	-6	-25	-6	-25				

Species name	All species		Woodland		Farmland		Upland	
	94-13	12-13	94-13	12-13	94-13	12-13	94-13	12-13
Wheatear	-10	-10					-10	-10
Willow/Red Grouse	-15	-21					-15	-21
Mallard	-15	-16						
Starling	-16	-3			0	1		
Stonechat	-17	-23						
Peregrine	-20	-1					-20	-1
Mistle Thrush	-22	-20	-22	-20				
Meadow Pipit	-23	-7					-23	-7
Oystercatcher	-24	3			-24	3		
Golden Plover	-30	-18					-30	-18
Dipper	-30	-5					-30	-5
Skylark	-33	1			-43	9	-25	-9
Rook	-36	-40			-36	-40		
Common Sandpiper	-40	5					-40	5
Linnet	-43	-7			-43	-7		
Black Grouse	-45	-3					-45	-3
Grey Wagtail	-47	-44						
Greenfinch	-48	-35			-46	-33		
Capercaillie	-49	-7	-49	-7				
Hooded Crow	-50	-21					-50	-21
Curlew	-56	-7					-56	-7
Lapwing	-56	17			-56	17		
Dotterel	-57	-7					-57	-7
Swift	-58	89						
Kestrel	-81	-49			-81	-49		