Wild Bird Population Trends in the Yorkshire Dales National Park: The Results of the Breeding Bird Survey 1994 and 2019

Sarah Harris[1], Ian Court[2] & Dario Massimino[1]

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[1]British Trust for Ornithology
The Nunnery, Thetford, Norfolk, IP24 2PU
Registered Charity No. 216652
and
[2]Yorkshire Dales National Park Authority, Colvend, Hebden Road, Grassington, Skipton, North Yorkshire, BD23 5LB

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EXECUTIVE SUMMARY

In order to monitor the population changes for bird species listed in the Local Biodiversity Action Plan (LBAP) for the Yorkshire Dales National Park (YDNP) Nature in the Dales 2020 Vision, the Yorkshire Dales National Park Authority (YDNPA) and the British Trust for Ornithology (BTO) have been working in partnership to increase coverage of BTO/JNCC/RSPB Breeding Bird Survey (BBS).

The area in which the report covers has been extended to include a larger area of Cumbria and a small part of Lancashire. Since 1994, when the BBS first started, 83 individual BBS squares have been covered, with peak coverage of 67 in 2011. In addition to this, the data used to produce the population trends within this report include data from the Upland Breeding Bird Survey (UBBS). This was carried out with professional fieldworkers, using paired squares which were surveyed between 2006 and 2013 and during this time, 57 individual squares were surveyed within the YDNP. These squares are no longer available for coverage and a focus remains on coverage of core BBS squares. In order to monitor changes in coverage within the available BBS square set in the YDNP area, the coverage information shown in this report does not include the UBBS coverage.

Since the last published report using data to 2015, coverage has remained fairly stable but does suggest the start of the slight decline in squares monitored each year, however, the extended area within which data are collated from the BBS, the increased sampling will further strengthen the robustness of the trends being reported. Smoothed trends can be calculated for four different time-scales; 1995 to 2018 (all-time), 2008 to 2018 (10-year), 2013 to 2018 (five-year) and the year-on-year change from 2018 to 2019. Data from 1994 to 2019 are used in this analysis, but the end years are truncated for the smoothed population trend values.

Species are required to reach a 'reporting threshold' in order to publish here. In this report, species reported on an average of 10 squares per year, during the reporting period (since 1994/all-time, 10- or five-years). However, species with a threshold lower than 20 are accompanied with the caveat that these trends are derived from small samples. Forty-one species reach the 10-square thresholds and are reported here. This excludes species not well monitored by the BBS such as gull species and those on passage, rather than breeding, such as Fieldfare. Each trend is accompanied by a 'flag' where the trend is statistically significant.

The results show that there are 28 species for which there are sufficient coverage and/or population change to determine statistically significant trends for at least one of the all-time, 10- or five-year study periods. This includes Yorkshire Dales National Park local biodiversity action species (highlighted in bold) **Cuckoo** *Cuculus canorus*, **Skylark** *Alauda arvensis*, **Starling** *Sturnus vulgaris* and **Song Thrush** *Turdus philomelos*. A further four BAP species are presented which are do not have a statistically significant trends however; provide results remain important indicators of change. These are **Curlew** *Numenius arquata*, **House Sparrow** *Passer domesticus*, **Lapwing** *Vanellus vanellus* and **Red Grouse** *Lagopus lagopus*.

Overall, 13 species have increased statistically significantly since the survey began in 1994, Yorkshire Dales National Park local biodiversity action species are highlighted in bold in this text: These include Blackbird *Turdus merula*, Buzzard *Buteo buteo*, Goldfinch *Carduelis carduelis*, Great Tit *Parus major*, Jackdaw *Coloeus monedula*, Mallard *Anas platyrhynchos*, Pheasant *Phasianus colchicus*, Robin *Erithacus rubecula*, **Skylark,** Snipe *Gallinago gallinago*, **Song Thrush,** Woodpigeon *Columba palumbus* and Wren *Troglodytes troglodytes*. One species has declined statistically significantly since 1994: Carrion Crow *Corvus corone*. In addition, 16 species with long-term trends from the surveys start, showed trends which were not statistically significant. Of these, four are Yorkshire Dales National Park local biodiversity action species; **Curlew**, **Lapwing**, **Red Grouse** and **Starling**. All indicate increases with the exception of Starling which suggests a slight decline.

With the addition of 10- and five-year trends, it is possible to report trends for an additional 11 species. Seven with both 10- and five-year trends, two with 10-year trends only and two with five-year trends only. Of these 11 additional species, two are species – **Cuckoo** and **House Sparrow** - on the Yorkshire Dales National Park local biodiversity action species list.

All 41 species, for which it is possible to calculate a trend, are accompanied with the year-on-year trend from 2018 to 2019.

INTRODUCTION

The Local Biodiversity Action Plan (LBAP) Nature in the Dales 2020 Vision details the conservation actions for the Yorkshire Dales National Park local biodiversity action species list, originated from the national Biodiversity Action Plan species list. In order to determine the population status of these species (listed in Appendix 3) a programme of survey and monitoring work has been undertaken.

For species such as **Black Grouse** *Tetrao tetrix*, that have a localised or restricted distribution, and/or require a specific methodology to be used to determine their population, single species surveys have been undertaken. There are a number of species, for example **Marsh Tit** *Poecile palustris*, where records are too irregular or infrequent that it is not feasible to establish an appropriate monitoring program and/or determine current status. The remaining species, for example **Skylark** are more widespread within the YDNP and so could potentially be monitored using more general survey methods but, limited resources mean that it is not feasible to undertake single species survey for all of these.

The Breeding Bird Survey (BBS) is the main national scheme for monitoring the population changes of the UK's common and widespread breeding birds, providing an important indicator of the health of the countryside. The BTO/JNCC/RSPB Breeding Bird Survey is a partnership jointly funded by the BTO, RSPB and JNCC, with fieldwork conducted by volunteers. The survey is an annual volunteer-based multi-species survey undertaken using strict sampling protocols across the UK (Harris *et al*. 2020). There was also a generic national

BAP action to enhance the coverage of the BBS across the country, and so the potential for using the BBS to monitor the populations of a number of wide ranging species such as Skylark that occur within the YDNP was assessed. During the first years of the survey less than 20 squares in the YDNP were surveyed but, this had increased to over 40 squares by 2011, still well below the total of 60+ randomly selected squares that were within the YDNP. Without any initial analysis, it was not known how many of the 'widespread' species were present within these squares and if they did, if there would be sufficient data to determine any population trends.

It was concluded that BBS offered the best potential for determining the population trends of widespread bird species in the YDNP, particularly if the number of squares that were not currently being surveyed could be increased. In addition, any increase in survey effort would also contribute to the generic national BAP target of increasing BBS coverage. In 2012, a partnership between the YDNPA and BTO looked to improve survey coverage within the YDNP and undertake periodic analysis of the data, with the first report published in 2014 (Risely and Court, 2014), the second in 2018 (De Palacio *et al.* 2018) and now this report.

This report brings a couple of changes. A larger area of coverage to assess and the addition of 10- and five-year trends, resulting in population trends for bird species monitored in sufficient numbers within the Yorkshire Dales National Park.

METHODOLOGY

Analytical Methods

The BBS is a line-transect survey based on randomly located 1-km squares. Squares are chosen through stratified random sampling, with more squares in areas with more potential volunteers. The difference in sampling effort is taken into account when calculating trends to account for any bias in coverage at a landscape scale. BBS volunteers make two early-morning visits to their square during the April–June survey period, recording all adult birds encountered while walking two 1-km transects across their square. Each 1-km transect is divided into five 200-m sections for ease of recording. Birds are recorded in three distance categories, or as 'in flight', in order to assess detectability and work out species density. Observers also record the habitat along transects, and counts of any mammals seen and records of any signs of mammals during the survey – mammal data collection being an optional extra. In addition, volunteers can collect information on how each bird was first detected; by song, call or visually, which should further assist with density research and it is possible to also record mammals seen or signs detected during the bird surveys too.

In addition, data from 28 Upland Breeding Bird Survey (UBBS) sites, covered by professional fieldworkers between 2006 to 2013 using the same survey method as 'core' BBS squares but surveyed in pairs are used in the trend production.

Surveying a BBS square involves around seven hours of fieldwork per year, and the aim is for each volunteer to survey the same square (or squares) every year. For these analyses we take the higher count from the two visits for each species, summed over all four distance categories and transect sections (usually ten and always four or more sectors). Only squares that have been surveyed in at least two years can be included in the analyses, since the analysis relies on comparisons between years. Population changes are estimated using a log-linear model with Poisson error terms. Counts are modelled as a function of year and site effects, weighted to account for differences in sampling effort across the UK. Standard errors and confidence intervals are estimated by bootstrapping.

Work has been carried out to assess the reliability of BBS trends, to ensure that reported trends are based on reliable data and sufficient sample sizes. This work has resulted in the following exclusions and caveats:

- The population trends for five species of gull (Black-headed *Chroicocephalus ridibundus*, Common *Larus canus*, Lesser Black-backed *Larus fuscus*, Herring *Larus argentatus* and Great Black-backed *Larus marinus*) are not reported, as a large proportion of the records are of non-breeding, wintering or migratory individuals.

- Trends for rare breeding species with substantial wintering populations (*e.g.* Fieldfare *Turdus pilaris*) are excluded.

- Trends for Cormorant *Phalacrocorax carbo*, Grey Heron *Ardea cinerea* and Common Tern *Sterna hirundo* are reported with the caveat that counts may contain a high proportion of birds away from breeding sites.

- Trends for Tawny Owl *Strix aluco* and Barn Owl *Tyto alba* are reported with the caveat that the BBS monitors nocturnal species poorly.

- Counts for six wader species (Oystercatcher *Haematopus ostralegus*, Golden Plover *Pluvialis apricaria*, Lapwing, Snipe, Curlew and Redshank *Tringa totanus*) are corrected to exclude counts from non-breeding flocks, and observations of Golden Plover in unsuitable breeding habitat are also excluded.

RESULTS

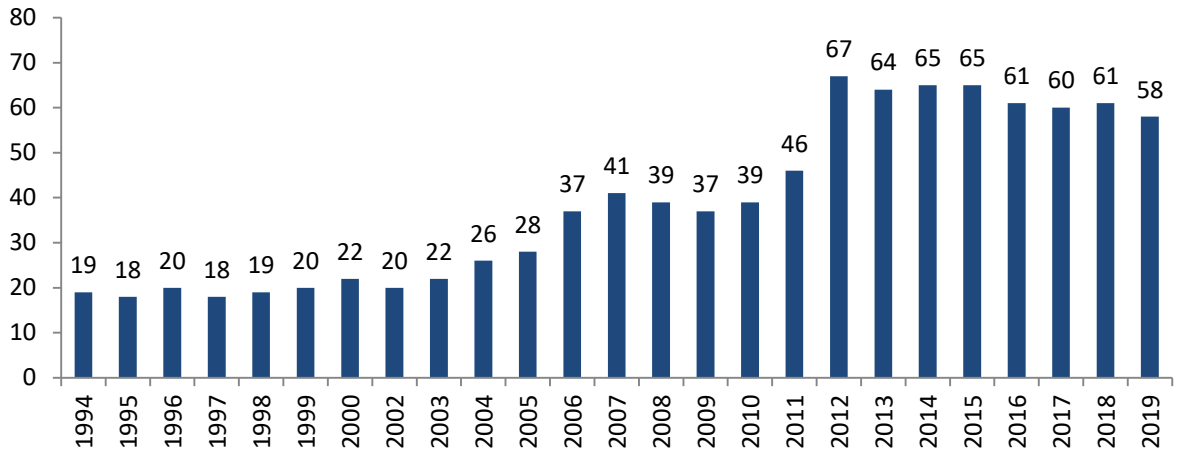
Survey coverage

The reporting area for this report has expanded since the last report was published in March 2018 (De Palacio, D. *et al.* 2018), to include a larger area of Cumbria and a small part of Lancashire. A map of square distribution since 1994 can be seen in Figure 3.

BBS coverage can be seen in Figure 1 and peaked in 2012, remaining relatively stable since then, up until recent years when there has been a slight decline in coverage. However,

coverage remains far higher than before the joint initiative between the YDNPA and BTO that included training of YDNPA staff and volunteers, and members of local natural history societies. Figure 1 does not include coverage of UBBS squares as these were covered by paid fieldworkers and therefore is not representative of the fantastic and appreciated volunteer effort involved with the long-term and ongoing survey coverage of such levels.

Figure 1. The numbers of squares covered by volunteers in the YDNP between 1994 and 2019. Foot and mouth prevented surveys taking place in 2001.



It should be noted that BBS trends depend on observing change on individual squares over time, and that sample sizes are averaged over the whole survey period being examined ('all-time', 10-year or five-year trend periods), so several years of increased coverage may be needed to appreciably improve population monitoring.

The Foot and Mouth outbreak in 2001 prevented many surveys across the UK from taking place and the fall in coverage in 2008–2010 coincided with breeding season fieldwork for the *2007–11 Bird Atlas* in which many BBS volunteers took part.

Annual trends

This report sees an increase in the number of species for which we can produce trends. In order to report a trend, the sample size for the given species must reach a threshold. Thirty species reached the threshold of being recorded on 10 or more 1-km squares, on average, per year throughout the lifetime of the survey (since 1994). In addition to this, we now report trends for the latest 10- and five-year periods of the survey. This means we have trends for an additional 11 species, where the same threshold is met for either or both of the 10- (2008-2018) and five-year (2013-2018) periods. Bringing the total number of species trends to 41.

Gulls are excluded and all trends and species with a sample size smaller than 20 squares on average are reported with the caveat that the trends may be unreliable, since the normal lower limit for reporting population trends at a site-based scale is 20 squares. All percentage

changes and sample sizes for each time period are shown in Table 1. Any species with a long-term trend are accompanied with the year-on-year change from 2018-2019.

At the longest scale (1995-2018), there are 17 species for which there are sufficient squares (20 squares on average per year) to calculate reliable trends. This includes BAP priority species **Curlew, Lapwing**, **Red Grouse** and **Skylark** and non-BAP species Blackbird, Carrion Crow, Chaffinch *Fringilla coelebs*, Jackdaw, Meadow Pipit *Anthus pratensis*, Oystercatcher, Pheasant, Pied Wagtail *Motacilla alba*, Swallow *Hirundo rustica*, Wheatear *Oenanthe oenanthe*, Woodpigeon, Wren and Willow Warbler *Phylloscopus trochilus*.

The analysis also shows that of these 17 long-term trends (1995-2018) with a sample threshold of at least 20 squares on average, six species have increased statistically significantly since the start of the survey. These are, in order of largest to smallest increase; Blackbird, Woodpigeon, Wren, Jackdaw, Pheasant and **Skylark,** the latter being a BAP species. One species: Carrion Crow, has declined statically significantly since the start of the survey. Ten species showed no statistically significant long-term change over the course of the survey, but the trend figure does still indicate change (BAP species flagged in bold text) with increases detected in Chaffinch, **Curlew**, **Lapwing**, Meadow Pipit, Oystercatcher, **Red Grouse**, Wheatear and Willow Warbler, and declines detected in Pied Wagtail and Swallow.

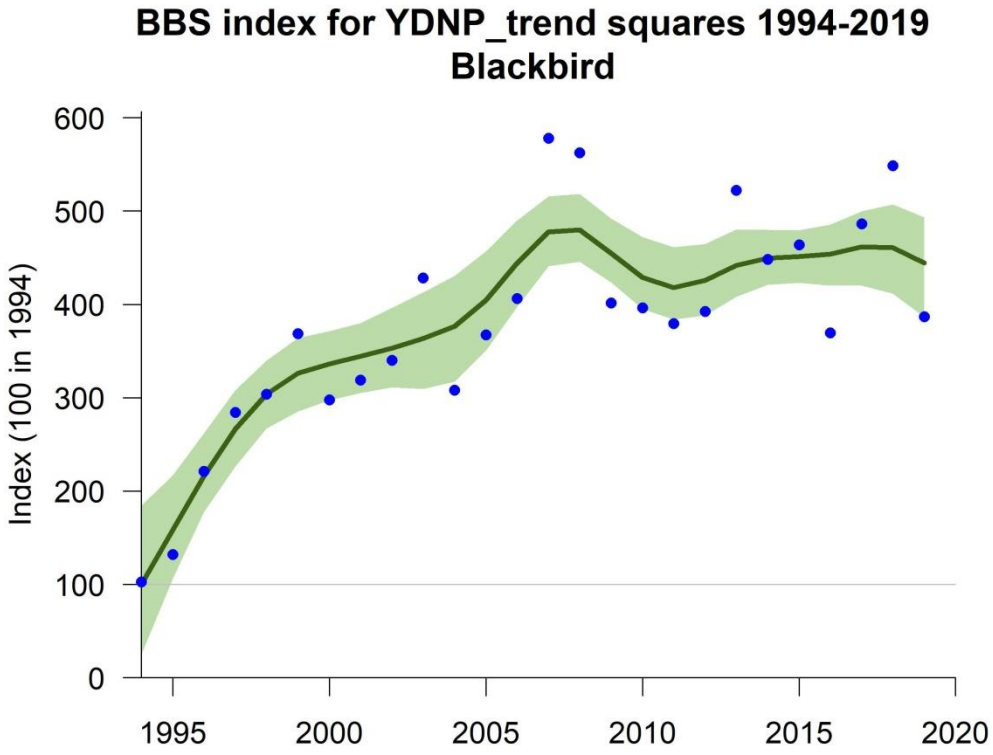
Statistically significant trends for the 10-year (2008-2018) period, with a sample size of 20 squares or more on average through this time period include Carrion Crow, Chaffinch, **Skylark**, Swallow and Wheatear. **Skylark** is a BAP species and all these species, except Skylark, are showing a statistically significant decline over the last 10 years.

Of the trends for the five-year period (2013-2018), eight species showed a statistically significant trend, with a sample size over 20 squares on average during these years. These were increases in Mistle Thrush *Turdus viscivorus*, **Starling**, Snipe, Woodpigeon and Wren and declines in Meadow Pipit, Swallow and Wheatear. Starling being the only BAP species in this suite.

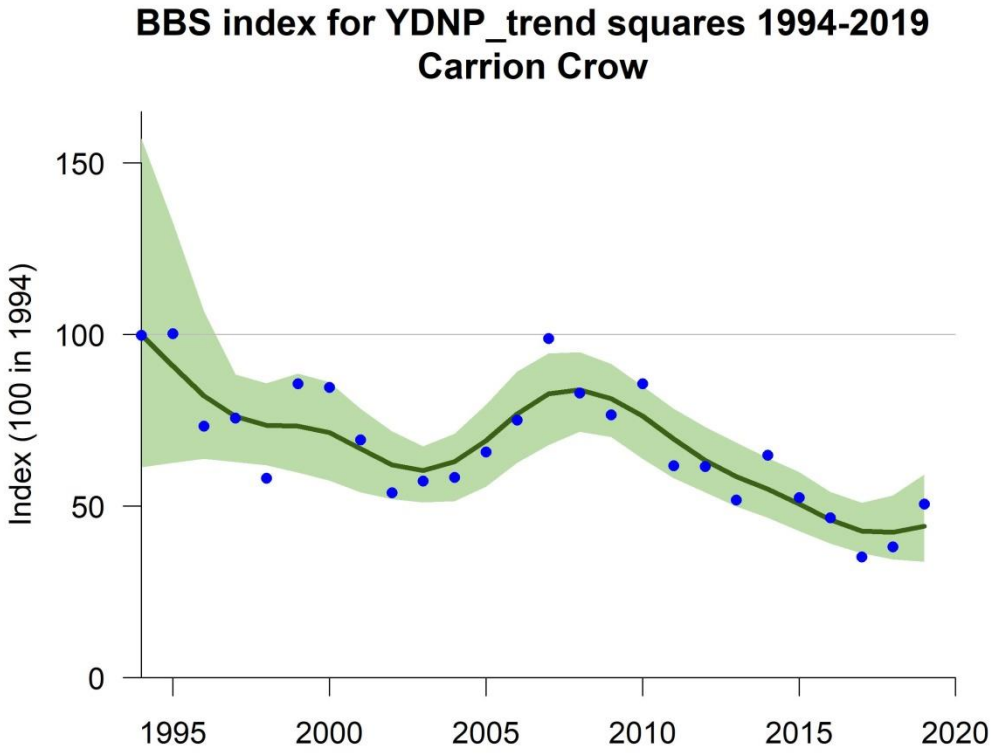
Generally, year-on-year trends fluctuate annually but are provided in this report for all species for which there is an all-time, 10-year or five-year trend. Of the 41 species reported with trend, nine trends covering 2018 to 2019 were statistically significant. Six show an increase and three a decline.

Figure 2. Population change index graphs for the 17 species recorded on at least 20 squares on average since the survey began. The 1994 value is set to an arbitrary value of 100; if the index rises to 200, the population has doubled, if it falls to 50 it has halved. The dark green line is the smoothed trend, the shaded area is the confidence interval (showing the upper and lower limits confidence intervals) and the blue dots are the annual index values. The annual index values run from 1994 to 2019 whereas the calculated smoothed trends (the change measure in Table 1) have had the end years truncated.

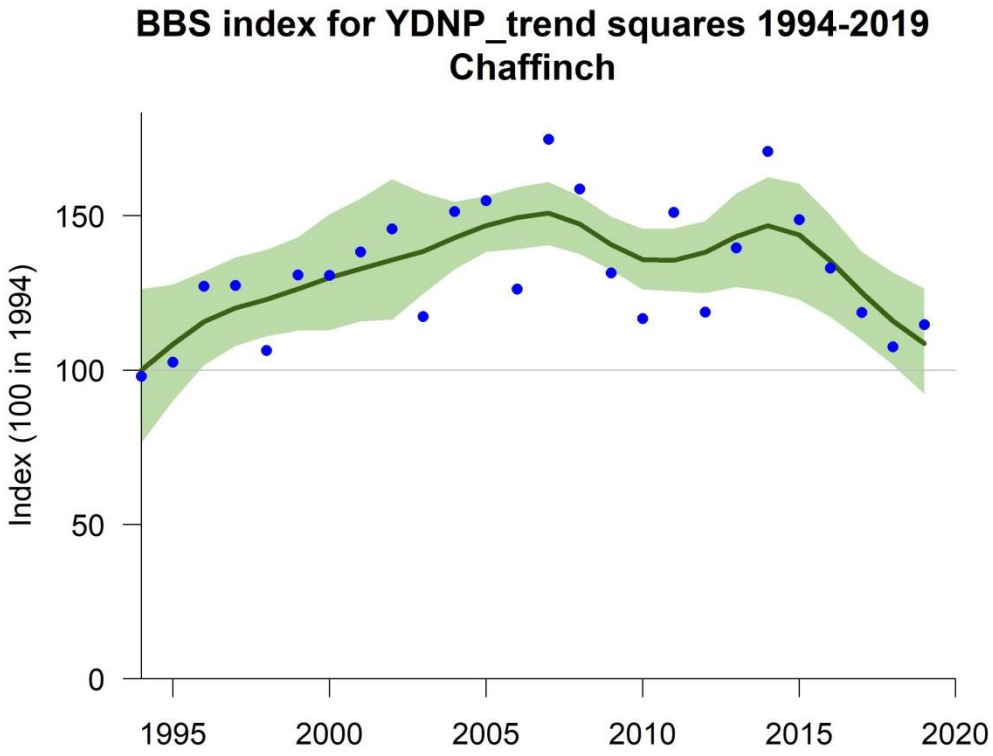
2.1) Blackbird



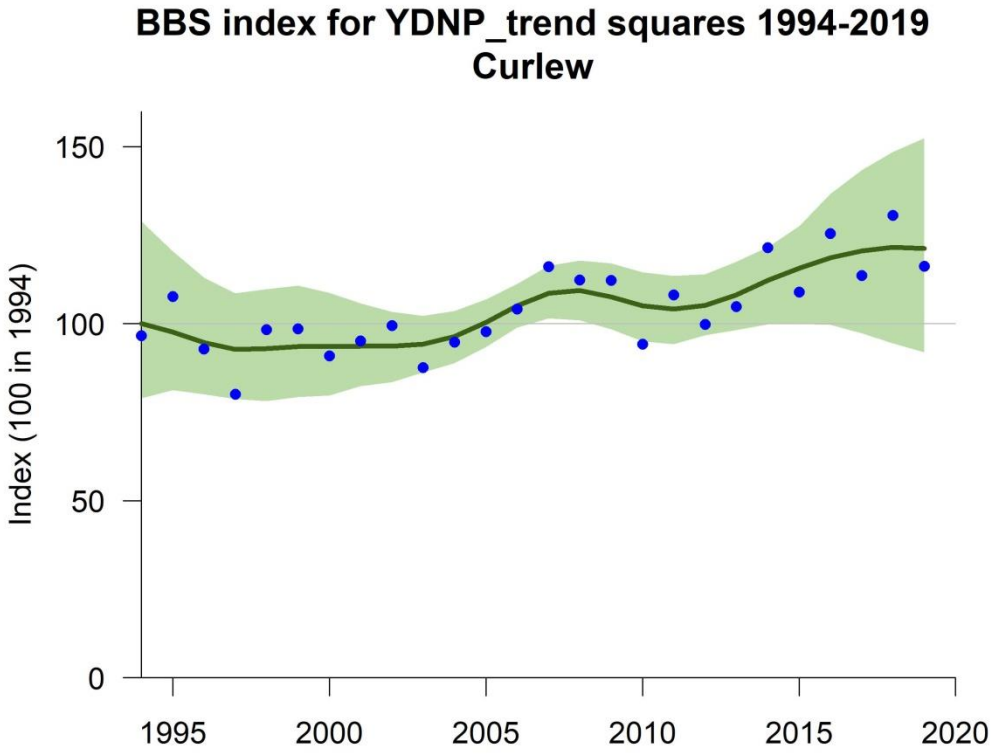
2.2) Carrion Crow



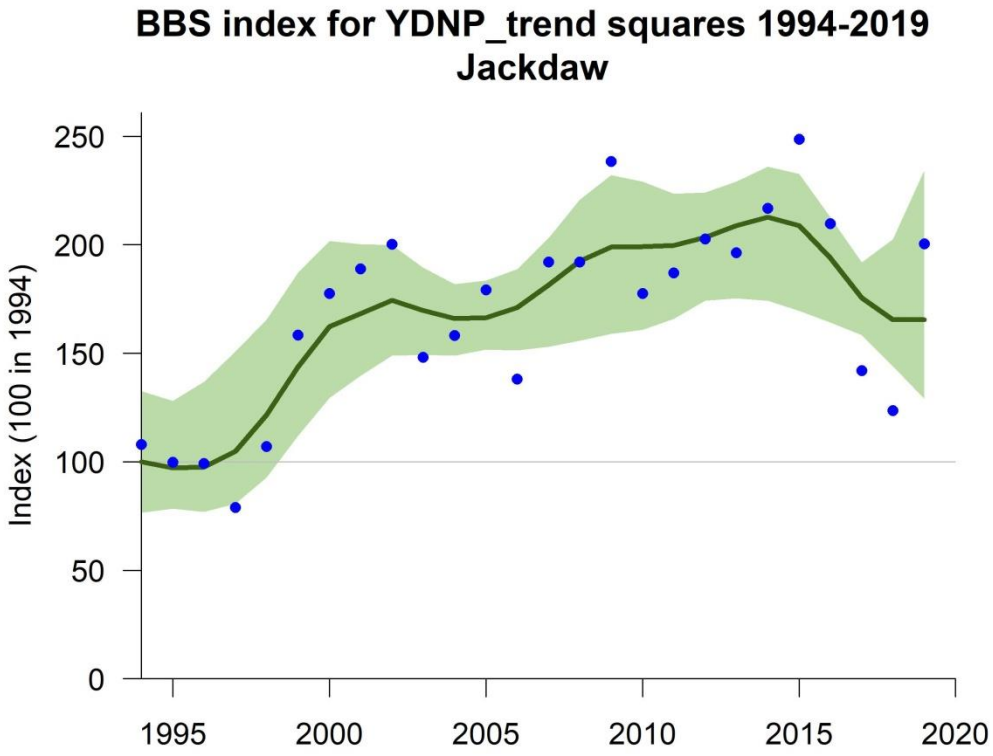
2.3) Chaffinch



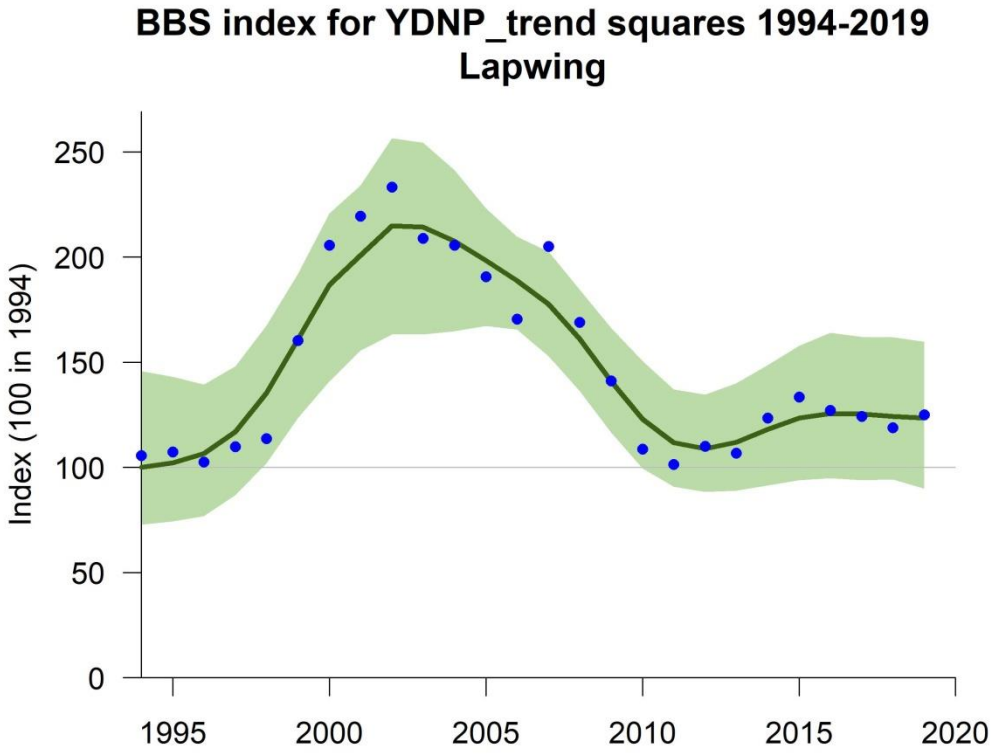
2.4) Curlew



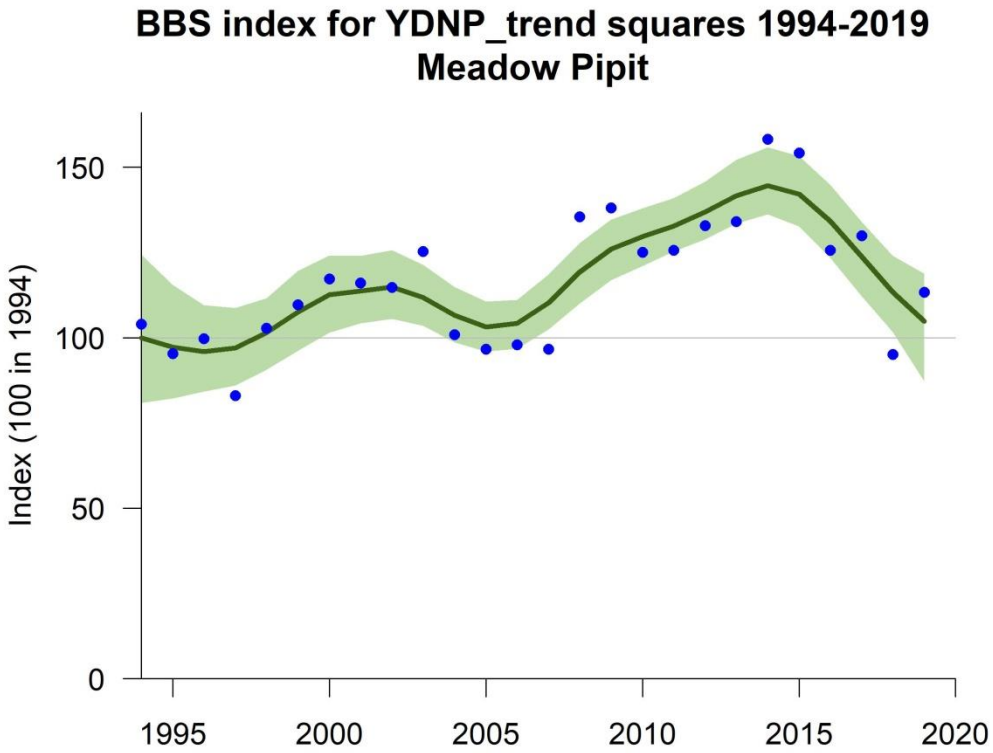
2.5) Jackdaw



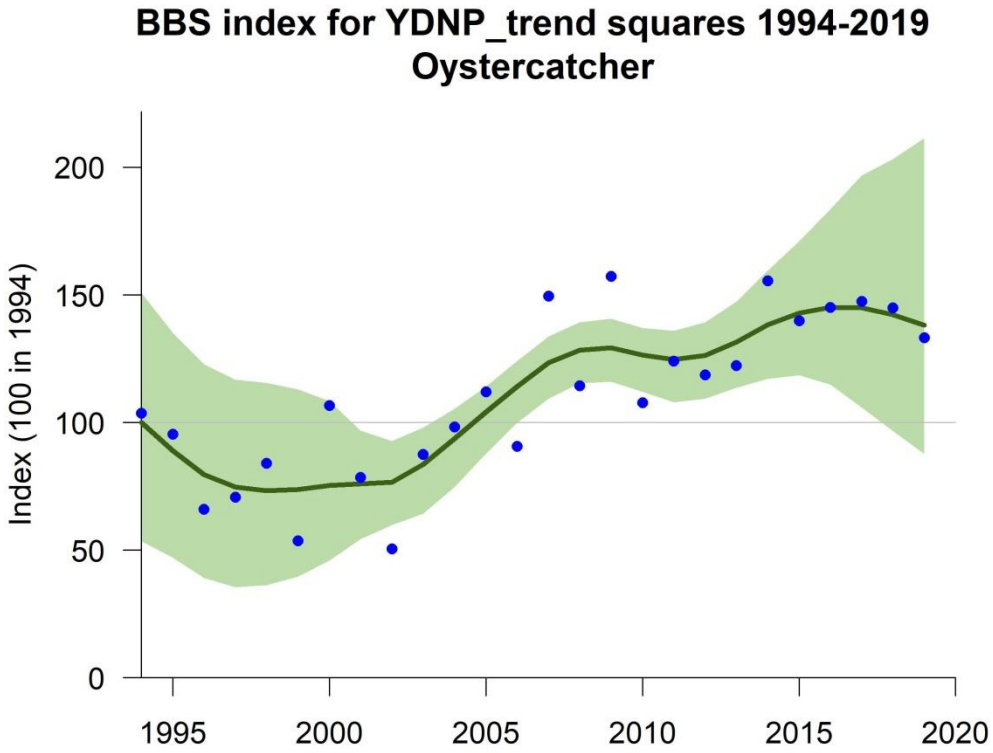
2.6) Lapwing



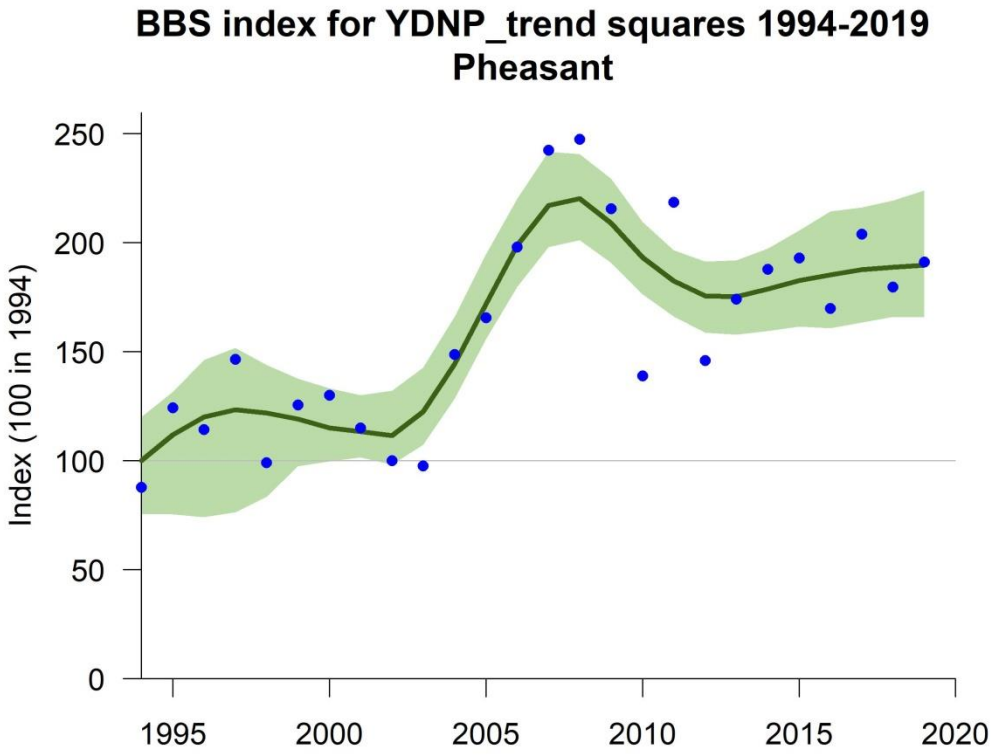
2.7) Meadow Pipit



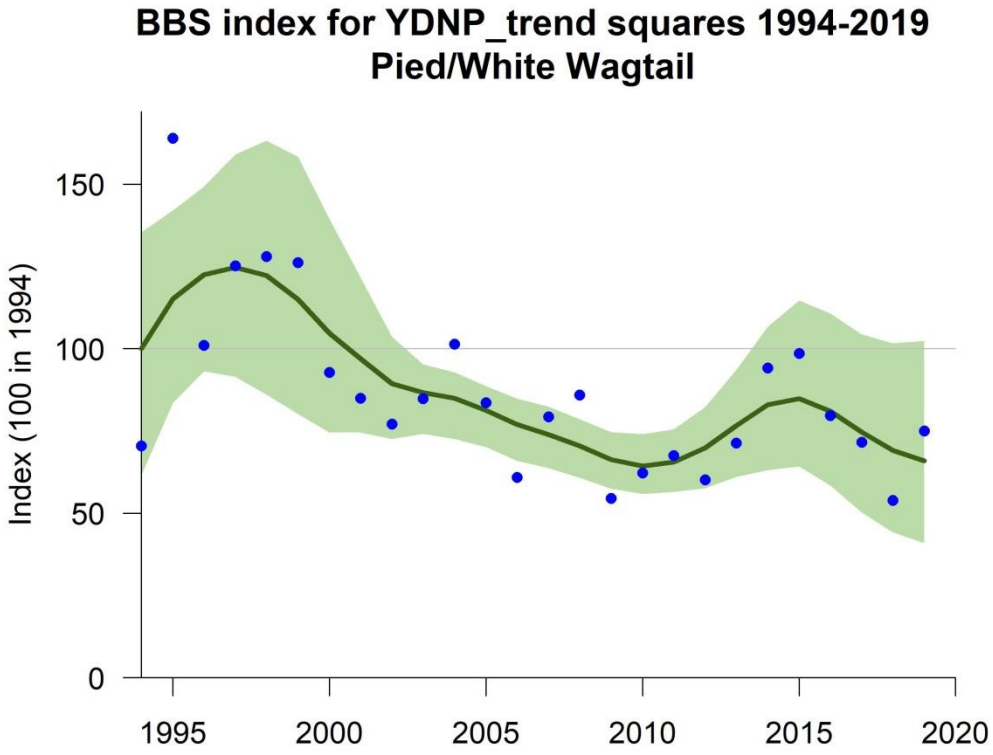
2.8) Oystercatcher



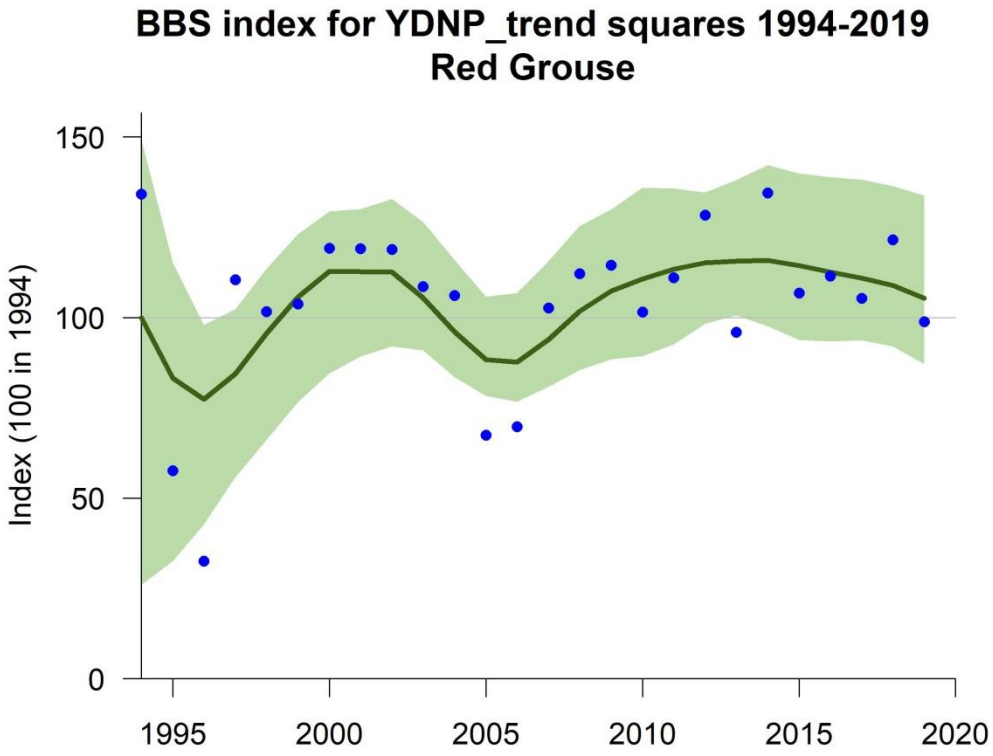
2.9) Pheasant



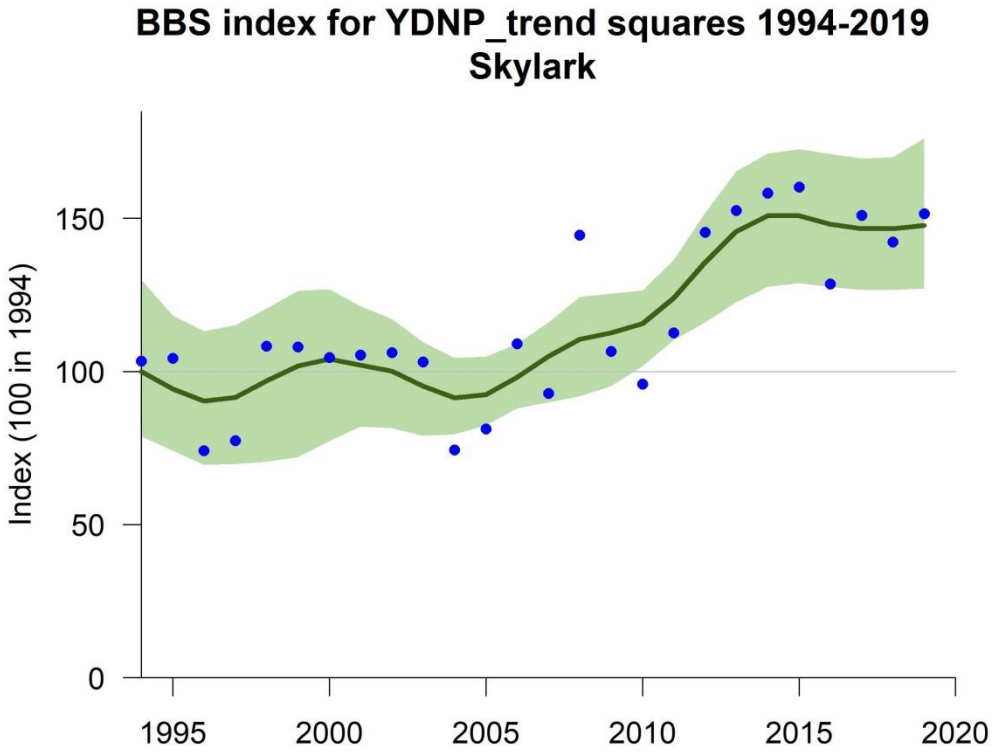
2.10) Pied Wagtail



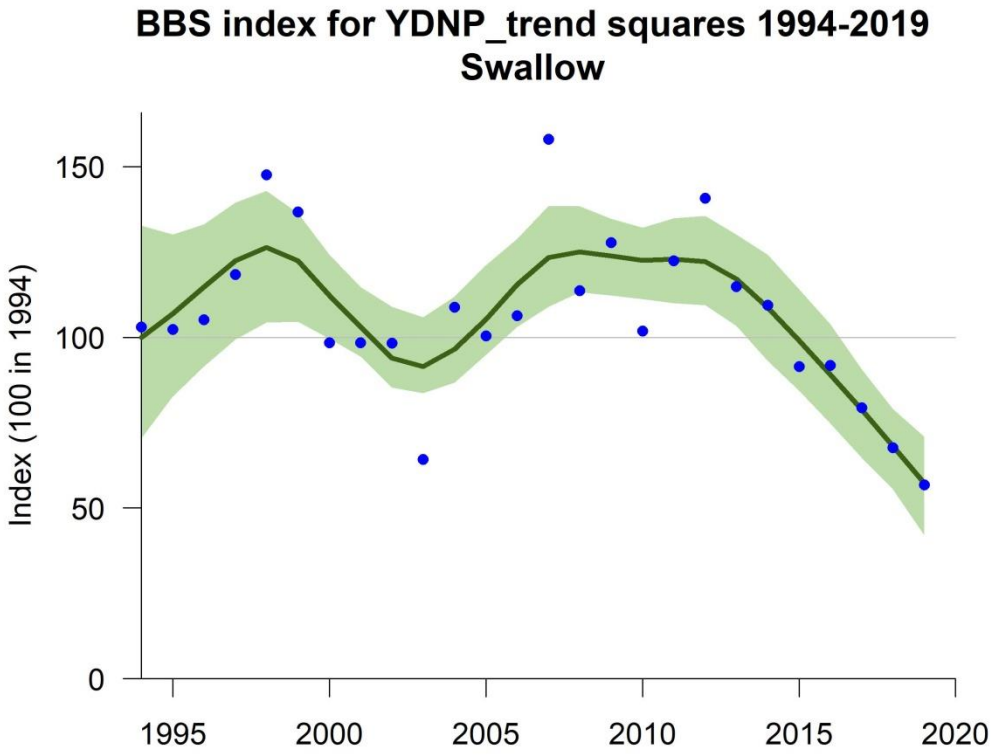
2.11) Red Grouse



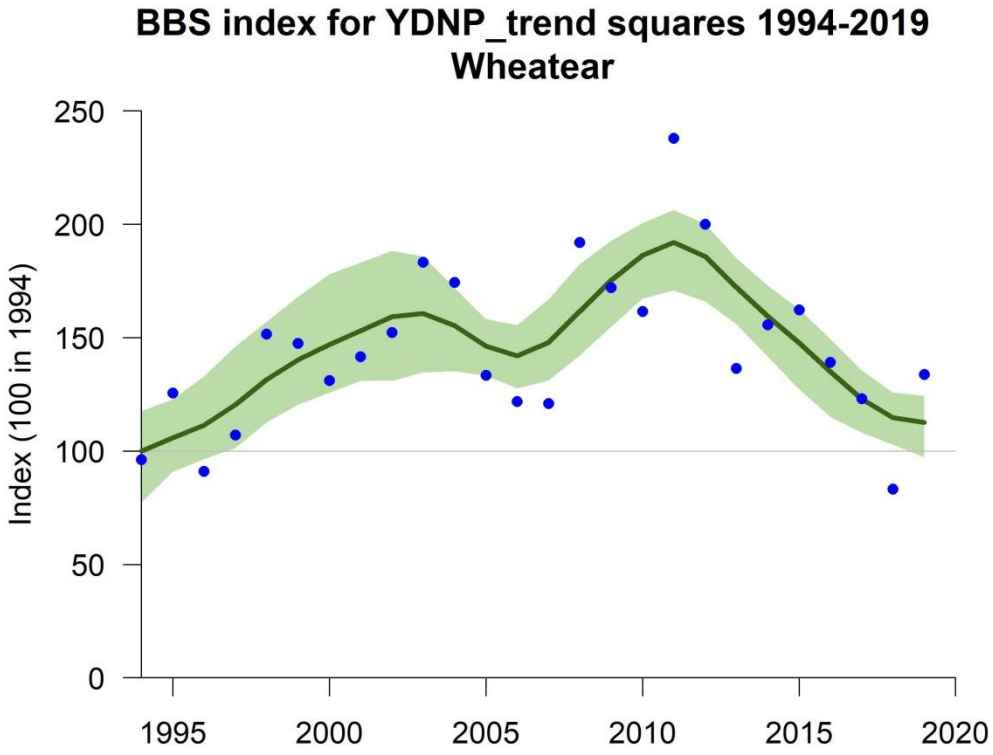
2.12) Skylark



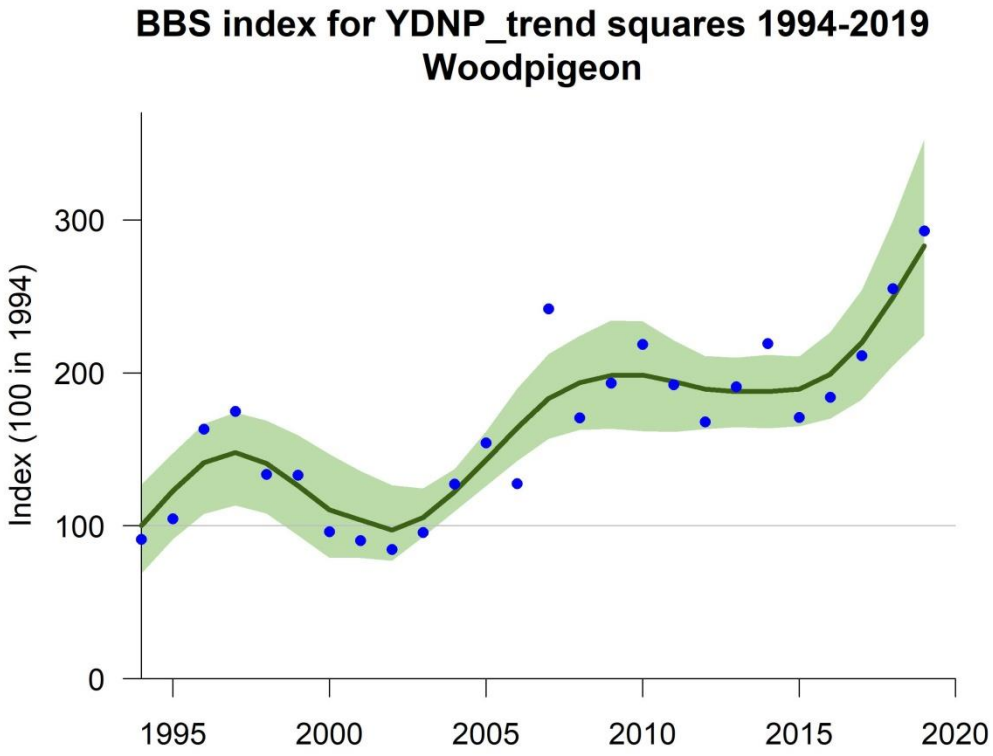
2.13) Swallow



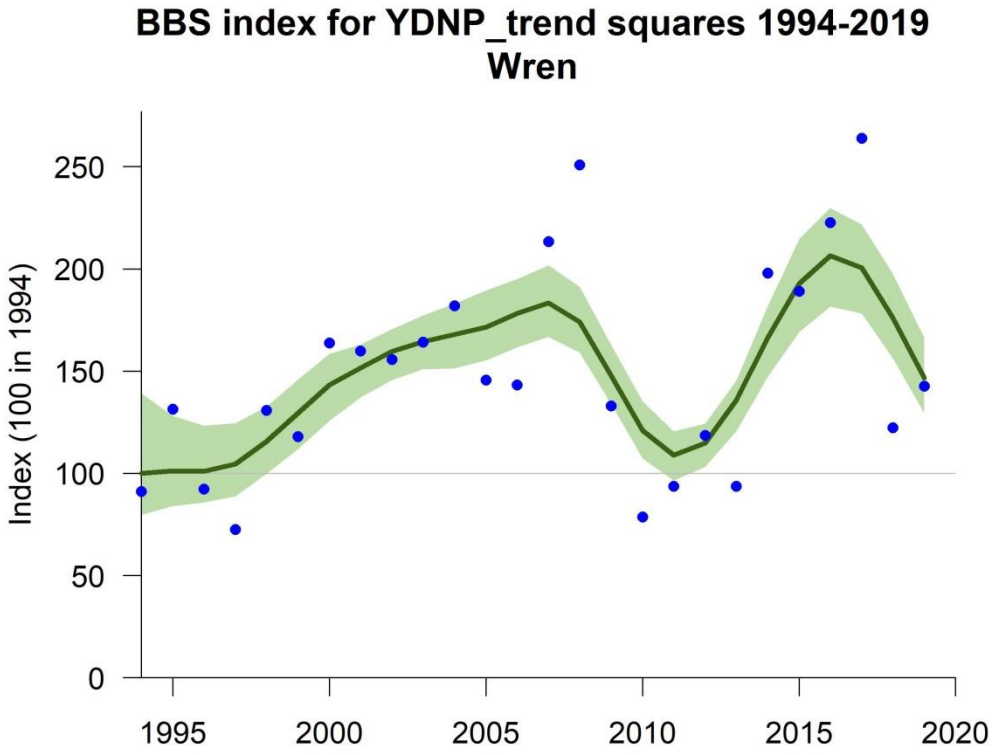
2.14) Wheatear



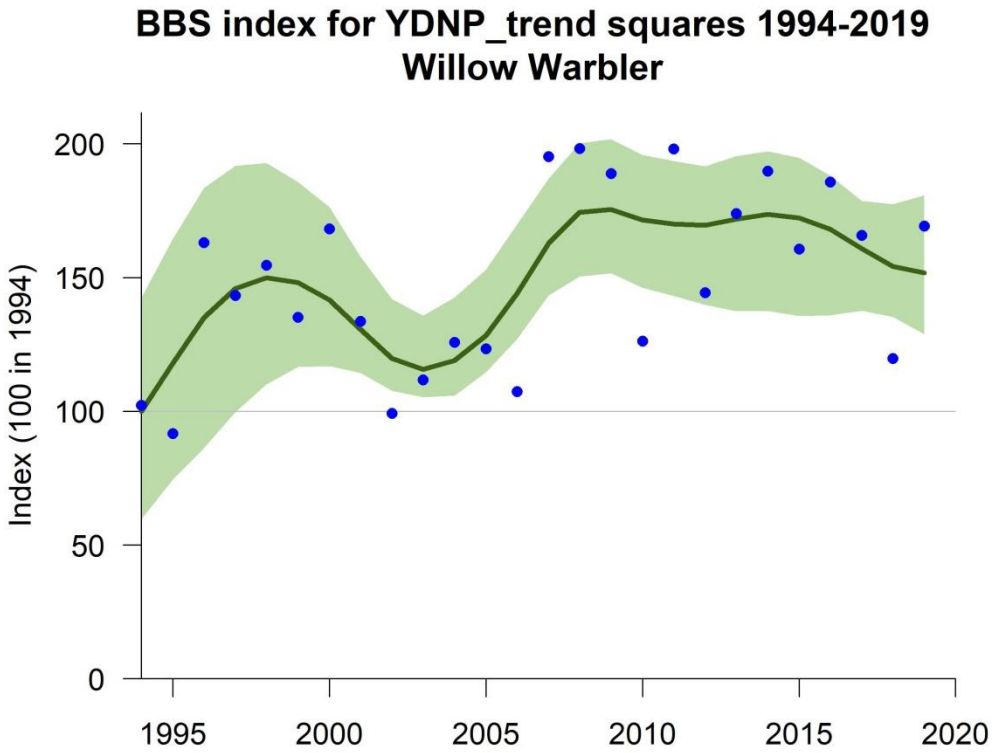
2.15) Woodpigeon



2.16) Wren



2.17) Willow Warbler



CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE WORK

During the period 2012 to 2019 the volunteer bird monitoring effort using the standardised BBS methodology has remained relatively stable and at a high level in the YDNP.

Long-term, this has increased the sample sizes dramatically and increased the monitoring value of this report and we are now able to produce shorter term trends for an additional suite of species meaning that we can now produce trends for 41 species. Seventeen of these have a good sample size (20 or more squares on average throughout the lifetime of the BBS) to produce robust trends, 28 species trends for the last 10-year period (2008-2018) and 24 species trends for the last five-year period (2013-2018). In addition, we have species trends for species with a lower threshold of 10 to 20 squares on average for the survey period being considered. These provide additional information but carry the caveat of a low sample size.

Of the 17 species with reliable trends, six showed a significant increase since 1994 (Blackbird, Jackdaw, Pheasant, **Skylark**, Woodpigeon and Wren). In contrast, one species, Carrion Crow, shows a statistically significant decrease since 1994. There was no statistically significant change for Chaffinch, **Curlew, Lapwing**, Meadow Pipit, Oystercatcher, Pied Wagtail, **Red Grouse**, Swallow, Wheatear and Willow Warbler since 1994.

It is currently not possible to produce trends for the following BAP species in the Yorkshire Dales National Park: **Black Grouse**, **Bullfinch**, **Grasshopper Warbler**, **Hen Harrier** *Circus cyaneus*, **Lesser Spotted Woodpecker** *Dryobates minor*, **Marsh Tit**, **Wood Warbler** *Phylloscopus sibilatrix* and **Twite** *Linaria flavirostris*. All but one (**Lesser Spotted Woodpecker**) have been recorded during BBS surveys on the YDNP land.

If volunteer engagement remains stable or increases, we hope to be able to produce trends for more species and a reigniting of participation promotion across the YNDP is recommended.

ACKNOWLEDGEMENTS

This work was done as a partnership between the BTO and the Yorkshire Dales National Park Authority. We are particularly grateful to all the volunteers who have carried out survey work. We also thank all the volunteers who surveyed squares in previous years, and the BTO Regional Organisers Colin Gay, Tony Cooper, Jean Roberts, Alex Gould, Mike Gibson and Mike Brown, alongside retired Regional Organisers who assisted with managing the survey locally over the years.

The BTO/JNCC/RSPB Breeding Bird Survey is a partnership jointly funded by the BTO, RSPB and JNCC, with fieldwork conducted by volunteers.

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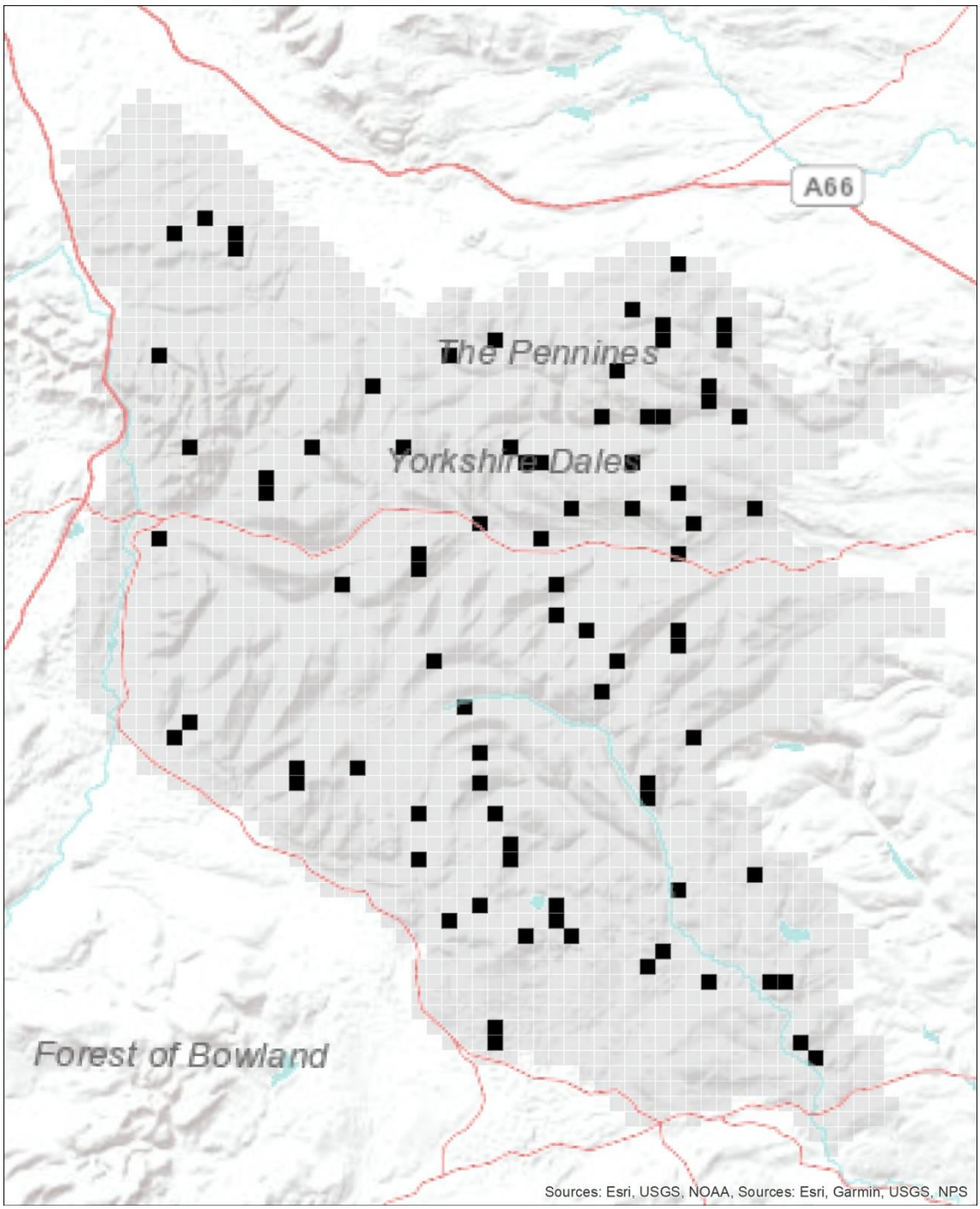
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APPENDIX 1

Figure 3. Survey coverage map (volunteer coverage only – excludes UBBS squares)



APPENDIX 2 Populations trends

UK trends	All-time, 23-year trends (1995-2018)					10-year trends (2008-2018)					5-year trends (2013-2018)					1-year trends (2018-2019)				BAP
Species	Sample	Change	Stat. Sig.	LCL	UCL	Sample	Change	Stat. Sig.	LCL	UCL	Sample	Change	Stat. Sig.	LCL	UCL	Change	Stat. Sig.	LCL	UCL	species?
Blackbird	21	191	*	70	378	30	-4		-22	13	29	4		-11	19	-29		-46	5	
Blackcap											11	99	*	7	207	3		-34	78	
Blue Tit	19	-13		-42	49	25	-20		-39	7	24	1		-18	32	41	*	8	90	
Buzzard	13	131	*	14	611	22	6		-50	85	18	28		-27	130	-29		-57	29	
Carrion Crow	31	-53	*	-75	-5	44	-49	*	-64	-28	42	-28		-46	1	33		-15	121	
Chaffinch	28	7		-22	51	37	-21	*	-34	-5	35	-19		-33	1	7		-12	23	
Cuckoo						10	249	*	62	653	12	73		-1	241	-50	*	-80	-11	Yes
Curlew	39	24		-30	95	55	11		-22	47	53	12		-16	40	-11		-23	9	Yes
Dunnock						12	-2		-39	77	11	-1		-29	46	99	*	10	310	Yes
Goldfinch	14	139	*	21	508	20	-13		-39	33	18	13		-16	73	1		-21	43	
Great Spotted Woodpecker						10	13		-28	77	10	70	*	16	179	-22		-62	69	
Great Tit	14	84	*	15	214	20	2		-31	47	19	-11		-32	16	-24		-48	21	
Grey Wagtail						11	-32		-67	33						-47		-84	27	
Greylag Goose						10	179	*	66	738	13	149	*	66	266	-18		-52	31	
House Sparrow						11	-1		-41	60	10	14		-20	50	-36	*	-49	-9	Yes
Jackdaw	26	70	*	9	162	36	-14		-37	40	34	-21		-37	20	62	*	20	114	
Kestrel	11	5		-36	100	17	-4		-34	48	14	42	*	10	91	-60	*	-83	-14	
Lapwing	27	22		-44	157	36	-23		-47	15	35	11		-14	41	5		-11	22	Yes
Mallard	19	105	*	59	298	28	-23		-49	3	28	-9		-36	20	-1		-26	31	
Meadow Pipit	40	16		-11	57	57	-5		-21	13	54	-20	*	-35	-9	19		-9	46	
Mistle Thrush	14	24		-32	187	20	-7		-41	33	20	32	*	2	84	-42		-76	21	
Oystercatcher	20	60		-40	533	30	11		-34	78	30	8		-26	62	-8		-29	19	
Pheasant	23	69	*	25	259	34	-14		-30	14	32	8		-10	35	6		-14	34	
Pied Wagtail	22	-40		-72	32	32	-2		-39	52	31	-10		-33	21	39		-7	120	
Raven						10	6		-61	315						-25		-87	163	
Red Grouse	20	31		-29	488	28	7		-27	54	28	-6		-27	15	-19		-40	19	Yes
Red-legged Partridge											10	64	*	19	144	80	*	10	227	
Redstart	10	9		-54	177	14	-32		-65	24	14	-51	*	-68	-32	22		-34	109	
Robin	17	97	*	21	378	24	4		-18	32	23	8		-13	36	11		-26	99	
Rook	19	-10		-60	144	27	-8		-43	65	23	-17		-42	62	-32		-70	7	
Skylark	32	56	*	1	139	45	33	*	3	89	43	1		-15	24	7		-11	22	Yes
Snipe	18	127	*	8	350	26	3		-33	59	27	47	*	3	107	-11		-50	42	
Song Thrush	14	456	*	250	1539	20	-6		-37	42	19	37	*	8	81	-2		-30	39	Yes
Starling	17	-12		-58	104	22	-24		-57	41	21	93	*	18	232	-32		-62	37	Yes
Stock Dove						12	-44		-63	49	11	-22		-39	27	-36		-79	122	
Swallow	26	-36		-61	4	36	-46	*	-59	-32	31	-42	*	-54	-30	-16		-51	37	
Swift						13	-56	*	-79	-17	11	15		-34	101	-28		-78	121	
Wheatear	28	9		-21	38	40	-29	*	-44	-9	38	-33	*	-41	-23	61	*	12	94	
Willow Warbler	22	31		-25	159	31	-12		-33	17	29	-10		-27	18	41	*	6	76	
Woodpigeon	22	103	*	44	257	31	29		-14	95	31	33	*	2	84	15		-14	53	
Wren	29	74	*	16	149	40	1		-22	30	38	30	*	13	52	17		-8	47	

APPENDIX 3 The local biodiversity action list of bird species in the Yorkshire Dales National Park.

Skylark *Alauda arvensis*
Tree Pipit *Anthus trivialis*
Lesser Redpoll *Carduelis cabaret*
Linnet *Carduelis cannabina*
Twite *Carduelis flavirostris*
Cuckoo *Cuculus canorus*
Lesser Spotted Woodpecker *Dendrocopos minor*
Reed Bunting *Emberiza schoeniclus*
Red Grouse *Lagopus lagopus*
Grasshopper Warbler *Locustella naevia*
Yellow Wagtail *Motacilla flava*
Spotted Flycatcher *Muscicapa striata*
Curlew *Numenius arquata*
House Sparrow *Passer domesticus*
Grey Partridge *Perdix perdix*
Wood Warbler *Phylloscopus sibilatrix*
Marsh Tit *Poecile palustris*
Bullfinch *Pyrrhula pyrrhula*
Starling *Sturnus vulgaris*
Black Grouse *Tetrao tetrix*
Song Thrush *Turdus philomelos*
Ring Ouzel *Turdus torquatus*
Lapwing *Vanellus vanellus*
Hen Harrier *Circus cyaneus*