South Downs Farmland Bird Initiative Monitoring

Results from 2014 to 2024

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Introduction

The South Downs Farmland Bird Initiative (SDFBI) is a collaboration between conservation organisations, farmers, and the South Downs National Park. It has provided information on avian farmland ecology and conservation to advisors and farmers seeking to improve the status of farmland birds across the South Downs. Organisations that have been involved with the SDFBI include The South Downs National Park Authority, the South Downs Farmers Group, The Sussex and Hampshire Ornithological Societies, The Game & Wildlife Conservation Trust (GWCT), The Royal Society for the Protection of Birds (RSPB), The British Trust for Ornithology (BTO), and Natural England.

Since 2014 the SDFBI has collated results from surveys of breeding farmland bird species, concentrating on ten (latterly nine) species commonly found in the mixed farmland landscape within the South Downs National Park. The species surveyed are grey partridge (*Perdix perdix*), lapwing (*Vanellus vanellus*), red kite (*Milvus milvus*), buzzard (*Buteo buteo*), skylark (*Alauda arvensis*), wheatear (*Oenanthe oenanthe*), meadow pipit (*Anthus pratensis*), linnet (*Linaria cannabina*), corn bunting (*Emberiza calandra*), and yellowhammer (*Emberiza citrinella*). After 2020, wheatear was no longer included in the survey.

The Farmland Bird Index is an indicator of the state of farmland birds across the country, published yearly. Six of the ten species recorded in the SDFBI monitoring are included in this index and are considered farmland specialists: grey partridge, lapwing, skylark, linnet, corn bunting, and yellowhammer. Additionally grey partridge, lapwing, skylark, linnet, corn bunting, and yellowhammer are included in the UK Red List of Conservation Concern, with wheatear and meadow pipit on the amber list of Conservation Concern, while red kite and buzzard are on the green list of Conservation Concern. The results from the SDFBI monitoring can be considered to provide useful information on the conservation status of farmland birds across the South Downs National Park.

Here we review the changes that have taken place in the occurrence and abundance (where possible) in the data recorded within the SDFBI monitoring and consider the distribution of the species on land predominately managed for agriculture across the South Downs National Park.

Storymap

The South Downs Farmland Bird Initiative Storymap is a visual guide for the SDFBI monitoring project. It is updated yearly to correspond with distribution changes for each of the six farmland specialist species; Grey Partridge, Lapwing, Skylark, Linnet, Corn bunting, and Yellowhammer. The maps for each species show us the trends of these six farmland bird populations across the South Downs from 2014 to 2024, with square kilometres designated to the frequency of each species recorded across the years.

Materials and Methods

Selection of survey squares

The SDFBI survey was designed to augment the area of farmland surveyed by the BTO's Breeding Bird Survey (BBS) across the South Downs National Park (SDNP). In order to do that, 1-km squares across the SDNP made up predominately of arable land or managed grassland managed through farming were identified through the use of the JNCC Landcover Map (2007). A random selection of these 1-km square was done, resulting in a pool of 100 squares. Results from squares that were originally part of the BBS survey and found to be both predominately made up of arable land or managed grassland used for farming are included in the SDFBI monitoring results. The first year of this additional monitoring was in 2014 (Table 1), with roughly equal numbers of BBS and randomly selected square providing information since then.

Table 1. Surveyed squares monitored each year for the SDFBI, with the number included in the BBS survey and the additional squares, selected at random.

Squares	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
BBS	45	46	45	49	48	46	33	46	45	52	54
Random	41	43	44	46	46	43	32	45	47	54	57

Survey method

The SDFBI monitoring follows a similar protocol to the BTO's Breeding Bird Survey, differing only in the species of birds that are recorded and with less complicated data recording. The BBS (and the additional SDFBI monitoring) require three visits to each square. The first visit allows the surveyor to familiarise themselves with the square and determine a route for the transect. The following two visits are made early in the-morning during the breeding season. These two visits require the surveyor to count all the birds seen or heard while walking two 1-km transects (lines) across the square. The BBS protocol requires that the surveyor records birds in 200-m sections and in bands of varying distance from the transect. This was considered too detailed for the additional squares selected for the SDFBI monitoring so bird numbers on these squares are recorded simply as a total for each species for each visit to the square. Additionally, only a restricted suite of species is recorded in the SDFBI squares – grey partridge, lapwing, red kite, buzzard, skylark, wheatear, meadow pipit, linnet, corn bunting, and yellowhammer, with wheatear recording stopping after 2020. Both BBS farmland squares and the SDFBI squares contribute data to the SDFBI monitoring. In each square, the maximum count for each of these species of interest from the two visits in each breeding season is used for the data analysis. There was some disruption to the survey in 2020 due to the Covid Epidemic that resulted in fewer areas surveyed and visits being undertaken later in the season. There are now four subsequent years in the dataset, which should result in this disruption having less effects on trends. It should also be borne in mind that the areas surveyed were on agriculturally managed land.

Mapping

Digital maps of the distribution of species **(presence/absence)** across the South Downs National Park were constructed in a geographical information system (GIS, ArcGIS Pro), for 2014, 2019 and 2024 to illustrate the distribution of each species. We selected these years to illustrate changes over the course of the monitoring. Maps for each species showing the number of individuals (**abundance**) recorded in square in 2014, 2019 and 2024 were also constructed. Maps were also constructed showing the total number of red-listed species (Grey partridge, lapwing, skylark, linnet, corn bunting, and yellowhammer) recorded on each square in 2014, 2019 and 2024, highlighting where conditions support these species of **conservation concern**. And finally, to identify "**hotspots**" for each species, maps were constructed showing, for each square that has been consistently monitored over the course of the study (2014 to 2024), the number of times a species has been recorded during the monitoring.

Analysis

We examined the long-term trends in population for each species where statistical analysis was possible. We used a similar cut-off point to that used in the calculation of the Breeding Bird Survey (BBS) results at the country and regional level. Only species that were recorded on an average of 30 or more 1-km squares across the eleven years of the survey could be used to examine the long-term population trends. We used an analytical approach that is like that used for analysing the Breeding Bird Survey (BBS). Using annual data at the 1-km square scale, we calculated a temporal index of abundance by fitting a generalised linear model with Poisson error and logarithmic link with the 1-km square and year as factors, then exponentiated the year coefficients to obtain annual index values (ter Braak et al., 1994). All index values were relative to the start year, which had a value of 1. Squares with only one year's data, i.e., sampled only once in the 11 years, were omitted. To reveal trends, we smoothed the index values by fitting a generalised additive model (GAM, Hastie & Tibshirani, 1990) with one degree of freedom (one decade) and calculated the percentage change between 2014 and 2024 as the percentage change in the smoothed values obtained for these two years. We obtained 95% confidence limits around the index values and measures of proportional change by bootstrapping at the field level (Hastie & Tibshirani, 1990). For each of 199 bootstrap runs, fields were selected at random with replacement, a new set of indices obtained as described above, a new GAM fitted, and new measures of change calculated. For each year and measure of change, the 95% confidence limits were taken as the lower and upper 95th percentiles of the distribution generated through bootstrapping. A change in abundance was deemed to differ significantly from zero when the 95% confidence interval of the change estimate did not overlap zero. All analysis was undertaken in Genstat version 23.1.0.651.

Results

In the results that follow the reader should bear in mind that these reflect the situation during the breeding season on farmland across the South Downs National Park. The abundance values used are the maximum recorded from two visits during the breeding season.

Grey partridge

From 2014 to 2024, very few grey partridges were recorded in the SDFBI monitoring (Figure 1). On average, grey partridges were found on four1-km squares each year (4.4% of the squares surveyed on average) over the eleven years of the survey – too few to reliably test for a population trend. There is no indication that the occurrence of grey partridges on arable land in the SDNP is declining, with the average occurrence in the first three years of the survey being 4.1%, while over the last three years of the survey the average occurrence was 4.3%. However, recording of grey partridges is very localised with the boundaries of the SDNP, with most sightings related to the Duke of Norfolk's Peppering Project. Efforts have been made to restore grey partridge numbers on the Peppering Project to provide for sustainable shooting (Ewald et al., 2012; Potts 2012). These included intensive habitat improvements (conservation headlands, beetle banks, wild bird cover plots and supplemental feeding) equating to at least 15% of the farmed area each year, as well as legal predator control during the breeding season.

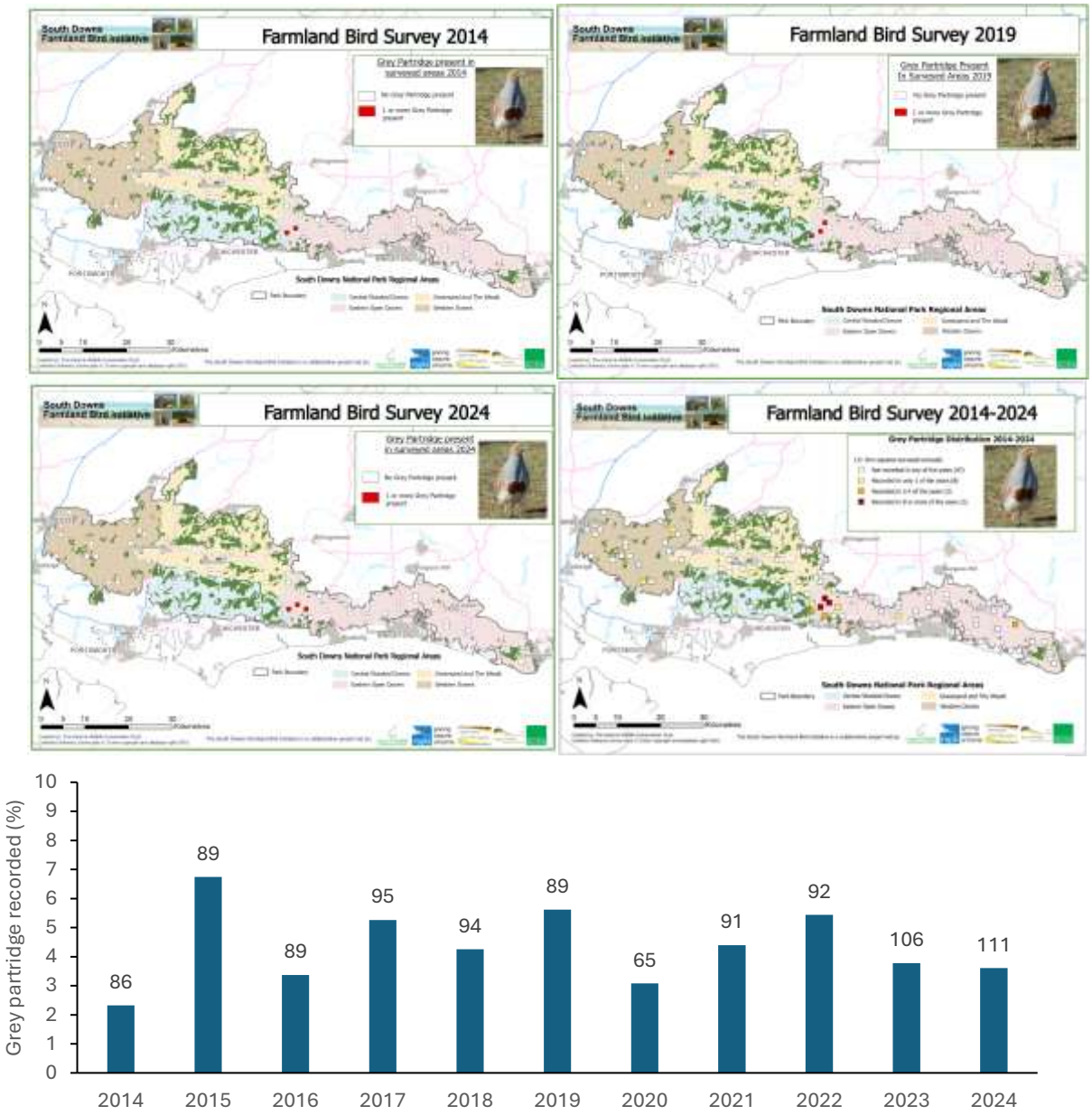
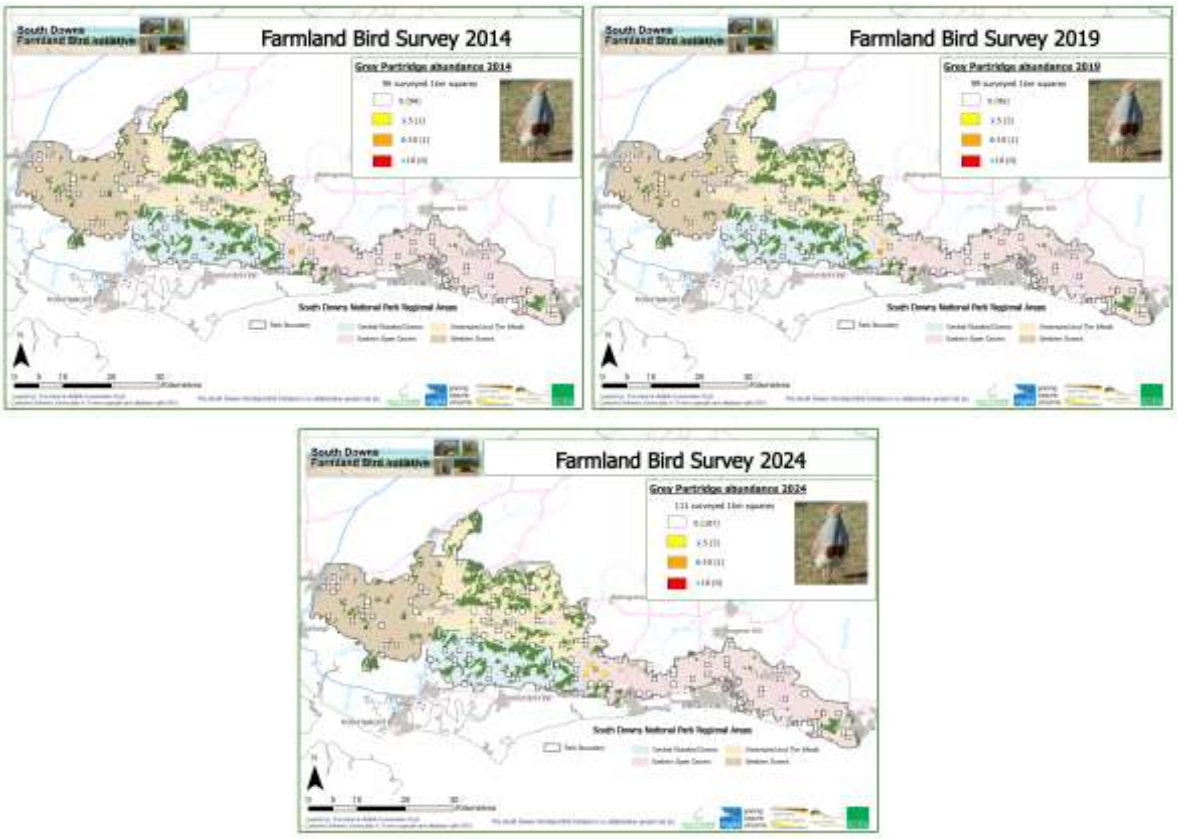


Figure 1. Maps of grey partridges recorded in the SDFBI monitoring in 2014, 2019, and 2024 and a hotspot map, followed by the yearly percentage of squares where grey partridges were recorded in the SDFBI monitoring. Data labels on the graph are the number of 1-km squares surveyed each year.

The average number of grey partridges recorded, on squares where they were found from 2014 to 2024 was 4.8 (± 0.3). There was an average of 6.4 grey partridges recorded in the first three years of the survey compared to an average 4.0 grey partridges in the last three years. This may reflect a decline in abundance – although the number of records is very low and there is substantial year-to-year variability (Figure 2).



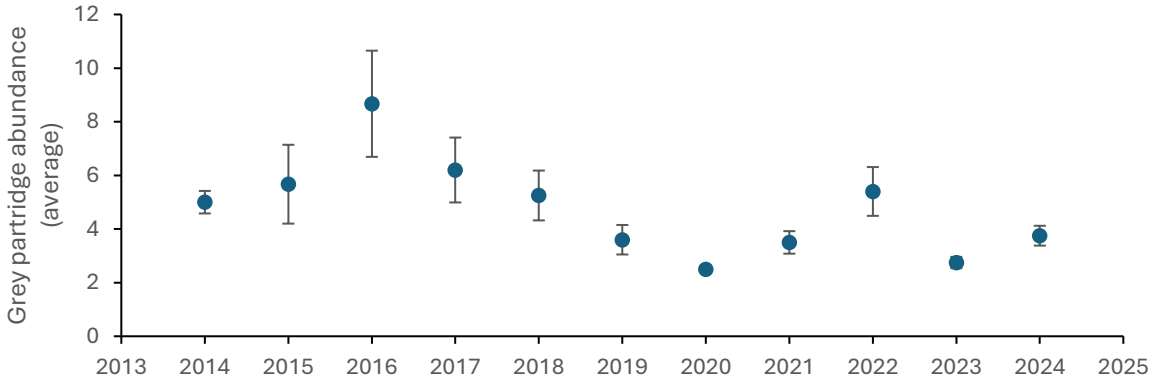


Figure 2. Maps of grey partridge abundance recorded in the SDFBI monitoring in 2014, 2019, and 2024. The graph displays the average number of grey partridges on 1-km squares where they were recorded in each year of the SDFBI monitoring. The error bars are ± standard errors.

Lapwing

There are very few records of lapwing in the SDFBI monitoring. They were recorded on an average of 6.5 1-km squares per year, with an average occurrence of 7.2% across the survey period. Again, this was too few to reliably test for a population trend. There is some indication that the occurrence of lapwings on arable land in the SDNP is declining, with the average occurrence in the first three years of the survey being 11.4%, while over the last three years of the survey the average occurrence was 3.5%. There were three hotspots of lapwing occurrence – one southwest of Midhurst, one near Coldwaltham, Sussex – west of the RSPB reserve at

Pulborough Brooks, and the other on the Duke of Norfolk's Peppering Project, including land along the river Arun.

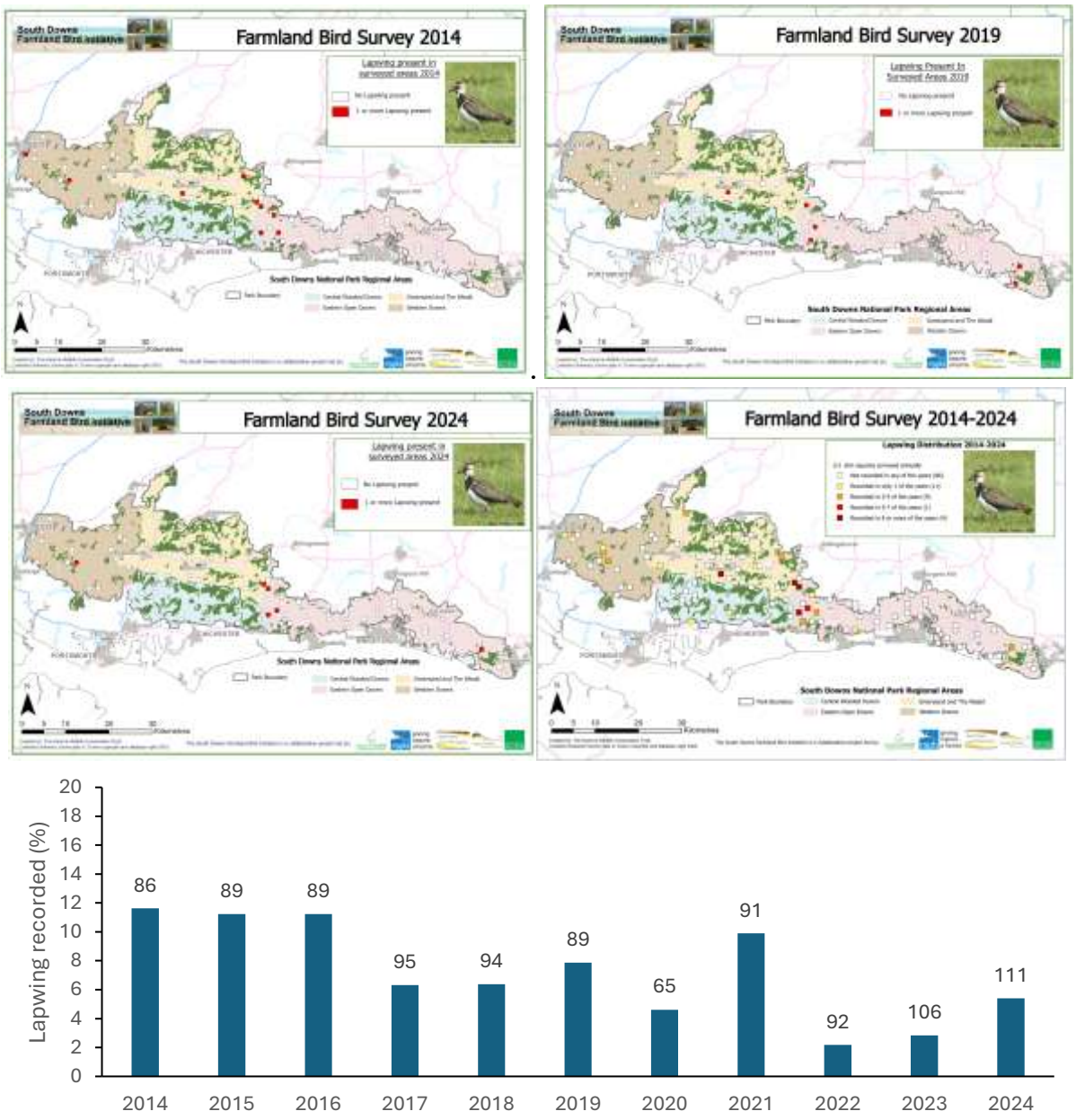


Figure 3. Maps of lapwing recorded in the SDFBI monitoring in 2014, 2019, and 2024 and a hotspot map, followed by the yearly percentage of squares where lapwing were recorded in the SDFBI monitoring. Data labels are the number of 1-km squares surveyed each year.

The highest numbers of lapwing were recorded on 1-km squares along the river Arun, from near Coldwaltham down to Arundel (Figure 4). On average there were 3.8 (± 0.2) lapwing recorded, on 1-km squares where they were found from 2014 to 2024. There was an average of 3.6 lapwing recorded in the first three years of the survey compared to an average of 2.7 lapwing in the last three years, with numbers in 2023 noticeably lower (Figure 4).

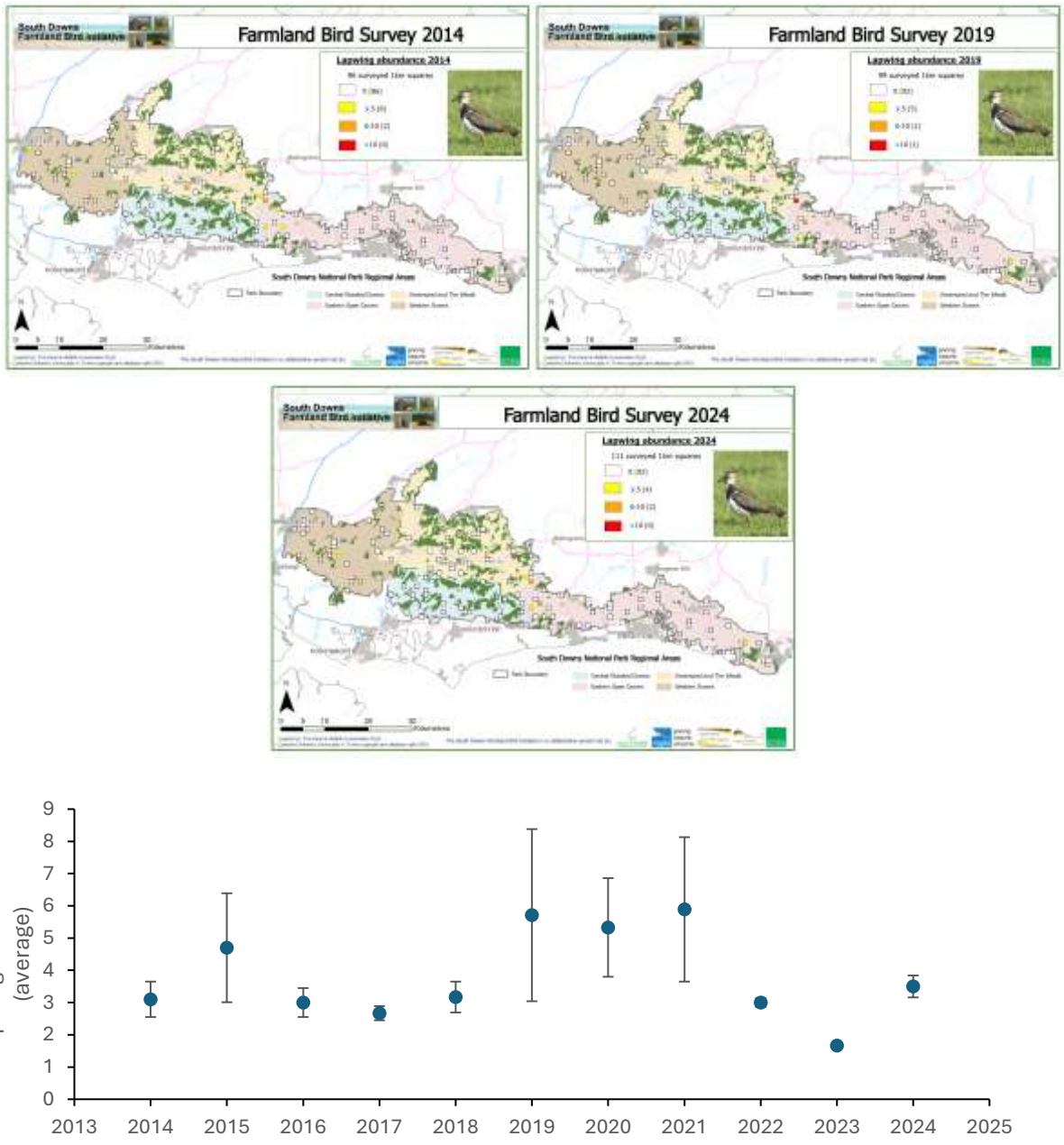


Figure 4. Maps of lapwing abundance recorded in the SDFBI monitoring in 2014, 2019, and 2024. The graph displays the average number of lapwings on 1-km squares where they were recorded in each year of the SDFBI monitoring. The error bars are ± standard errors.

Red kite

Red kites have been recorded on an average of 25 1-km squares surveyed over the time of the SDFBI. This is nearly to the level required to calculate a reliable population trend, with recent years indicating an increased distribution of red kites (Figure 5). In the first three years of the survey, red kites were recorded on an average of 15.1% of the squares surveyed, while in the last three years they have been recorded on an average of 42.6%. Although the map for 2024 indicates that red kites were recorded throughout the SDNP, three hotspot localities across the survey period stand out. One to the west of the SDNP near Wheely Down, scattered locations

to the south of Midhurst in the Greensands & Weald stretching down towards Havant across the Central Wooded Downs and finally a hotspot centred on the Duke of Norfolk's Peppering Project near Arundel.

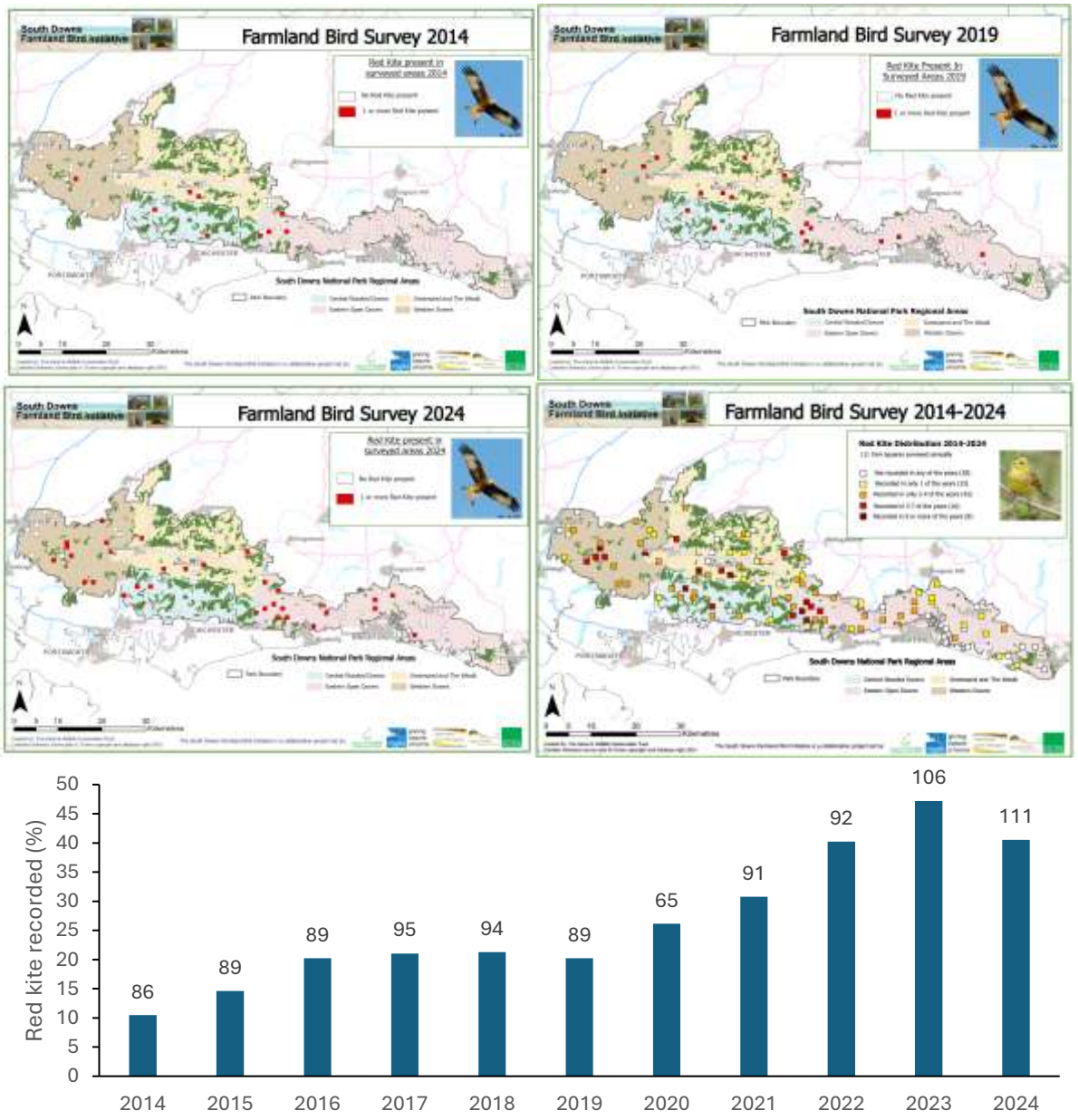


Figure 5. Maps of red kites recorded in the SDFBI monitoring in 2014, 2019, and 2024 and a hotspot map, followed by the yearly percentage of squares where red kites were recorded in the SDFBI monitoring. Data labels are the number of 1-km squares surveyed each year.

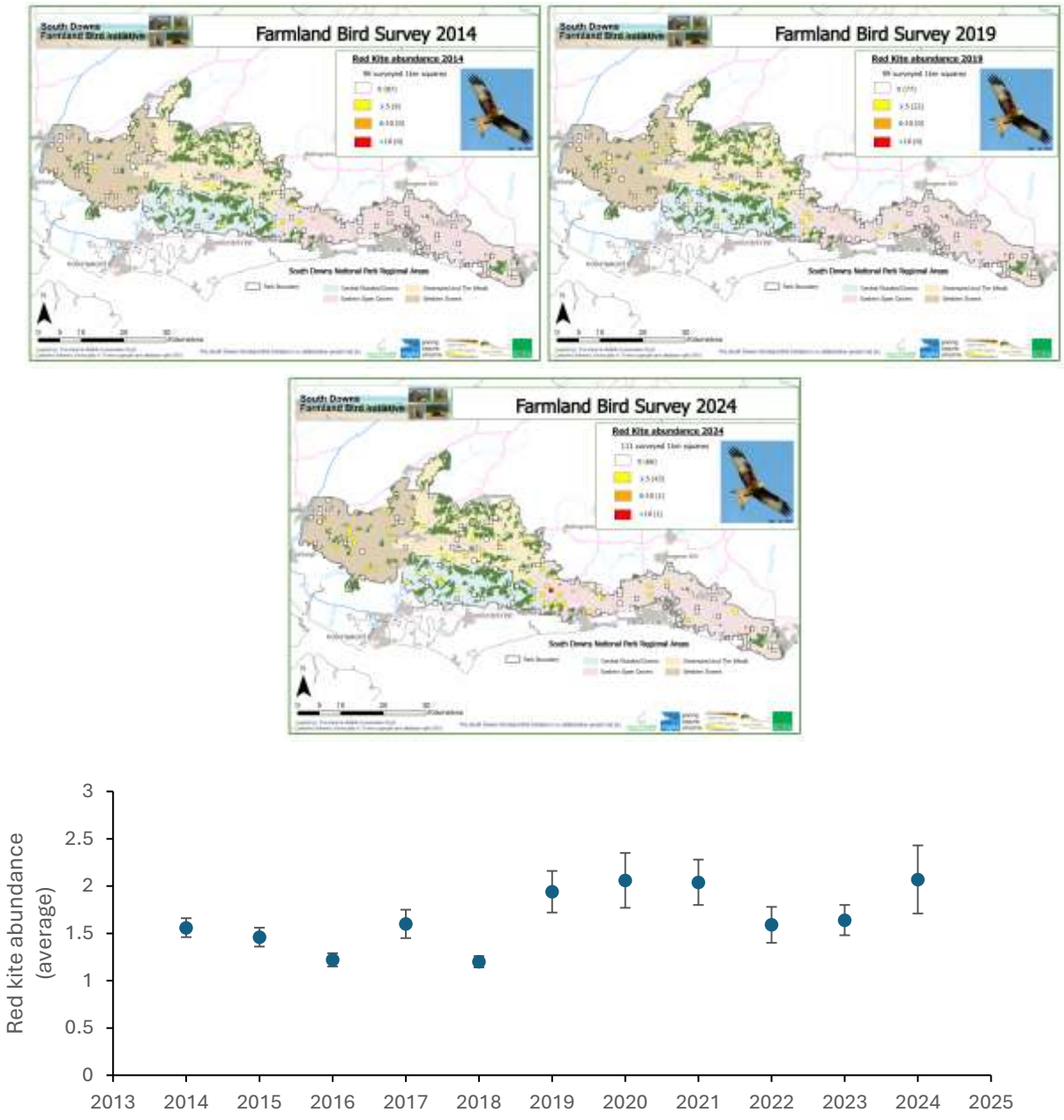


Figure 6. Maps of red kite abundance recorded in the SDFBI monitoring in 2014, 2019, and 2024. The graph displays the average number of red kites on 1-km squares where they were recorded in each year of the SDFBI monitoring. The error bars are ± standard errors.

The maps of red kite abundance highlight the hotspot nature of the Duke of Norfolk's Peppering Project for this species in the SDNP. On average there were 1.7 (± 0.1) red kites on the 1-km squares where they were recorded from 2014 to 2024. There was an average of 1.4 red kites per square recorded in the first three years of the survey compared to an average of 1.8 in the last three years, perhaps reflecting some increase in abundance (Figure 6).

Buzzard

Buzzards were found throughout the SDNP, across an average of 62.4 1-km squares from 2014 to 2024, an average of 68.1% of the sampled areas. In the first three years of the SDBFI survey buzzards were reported on an average of 73.0% of the squares surveyed, compared to an average of 66.7% of 1-km squares from 2022 to 2024, a slight decline (Figure 7). With such a widespread species it is difficult to highlight any hotspots of buzzard occurrence, with perhaps an indication that sightings are less common in the north of the Greensand & Weald.

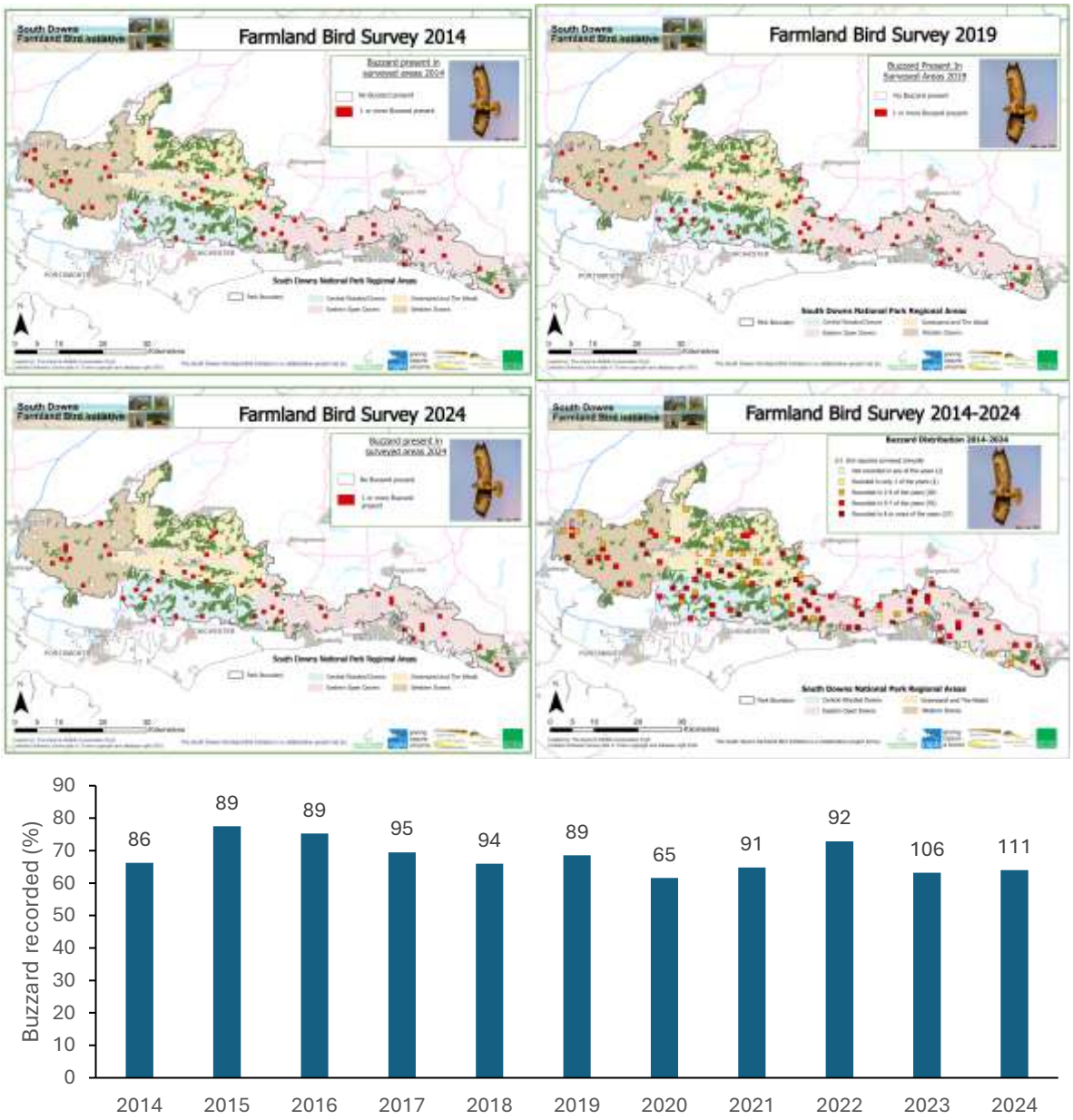
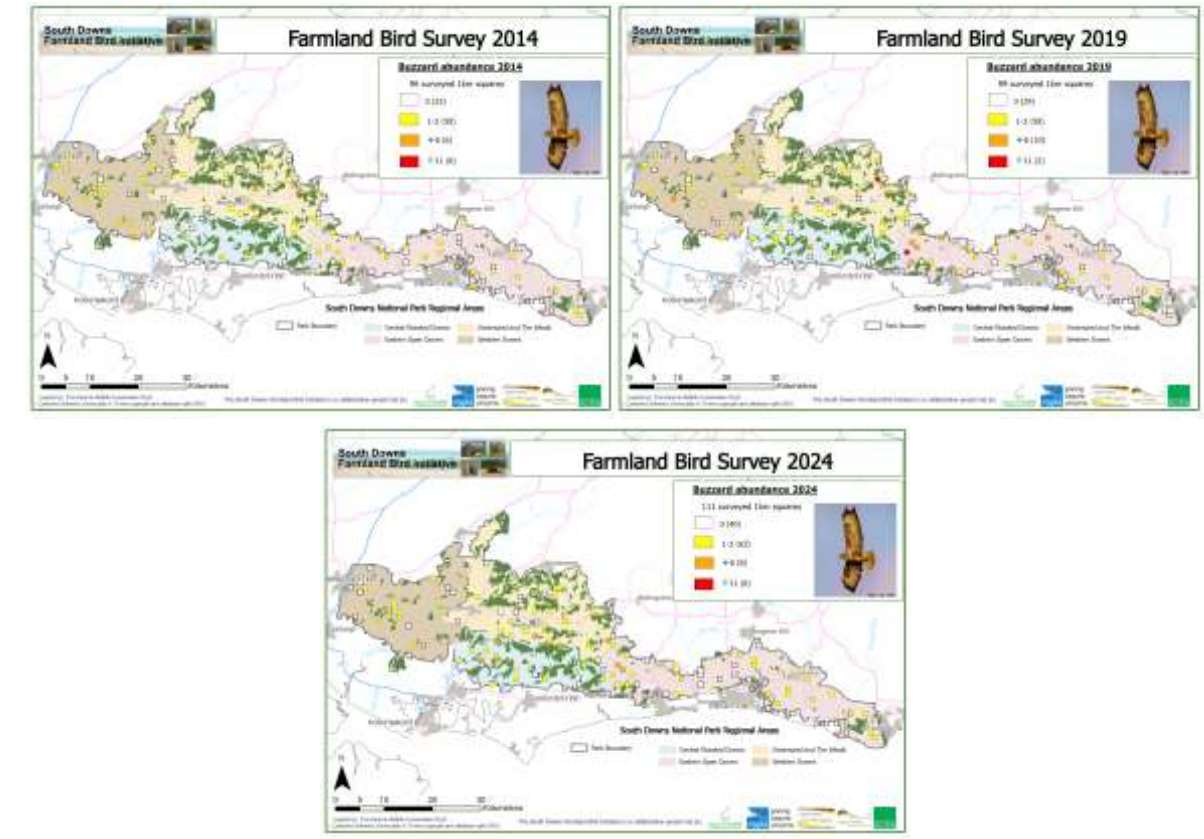


Figure 7. Maps of buzzard recorded in the SDFBI monitoring in 2014, 2019, and 2024 and a hotspot map, followed by the yearly percentage of squares where buzzard were recorded in the SDFBI monitoring. Data labels are the number of 1-km squares surveyed each year.

The highest abundance of buzzards has tended to be on 1-km squares in the Central Wooded Downs and the Greensand & the Weald or squares directly adjacent to these areas –

particularly on the Duke of Norfolk's Peppering Project. Across the eleven years of the SDFBI monitoring, buzzard showed a non-significant decline, -15% (-29% to 1.8%), with the 95% confidence interval including zero (Figure 8). On the 1-km squares where they were recorded in the first three years of the survey there was an average of 2.0 buzzards per square. In the last three years of the survey there were an average of 1.9 buzzards per square.



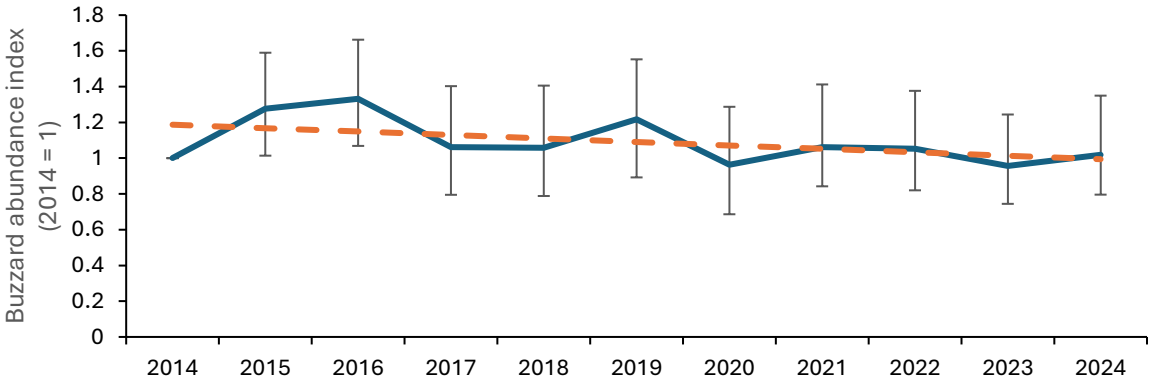


Figure 8. Maps of buzzard abundance recorded in the SDFBI monitoring in 2014, 2019, and 2024 and results from the analysis of the population trend in buzzard over the course of the SDFBI monitoring. The blue line is the annual index of abundance for buzzard, with the long-term trend shown by a dashed red line.

Skylark

Skylark have been found throughout the SDNP over the course of the SDFBI monitoring, recorded on an average of 74.6 1-km squares throughout the period. This equates to an average of 81.4% of surveys recording skylark over the eleven years (Figure 9). From 2014 to 2016, skylarks were recorded on an average of 80.0% of squares and over the last three years they were recorded from an average of 82.6% of squares, perhaps a slight increase. Like buzzards, skylarks are a widespread species, associated with open farmland, and it is difficult to identify any hotspots of occurrence. There may be an indication that sightings are less common on the northern part of the Greensand & Weald (Figure 9).

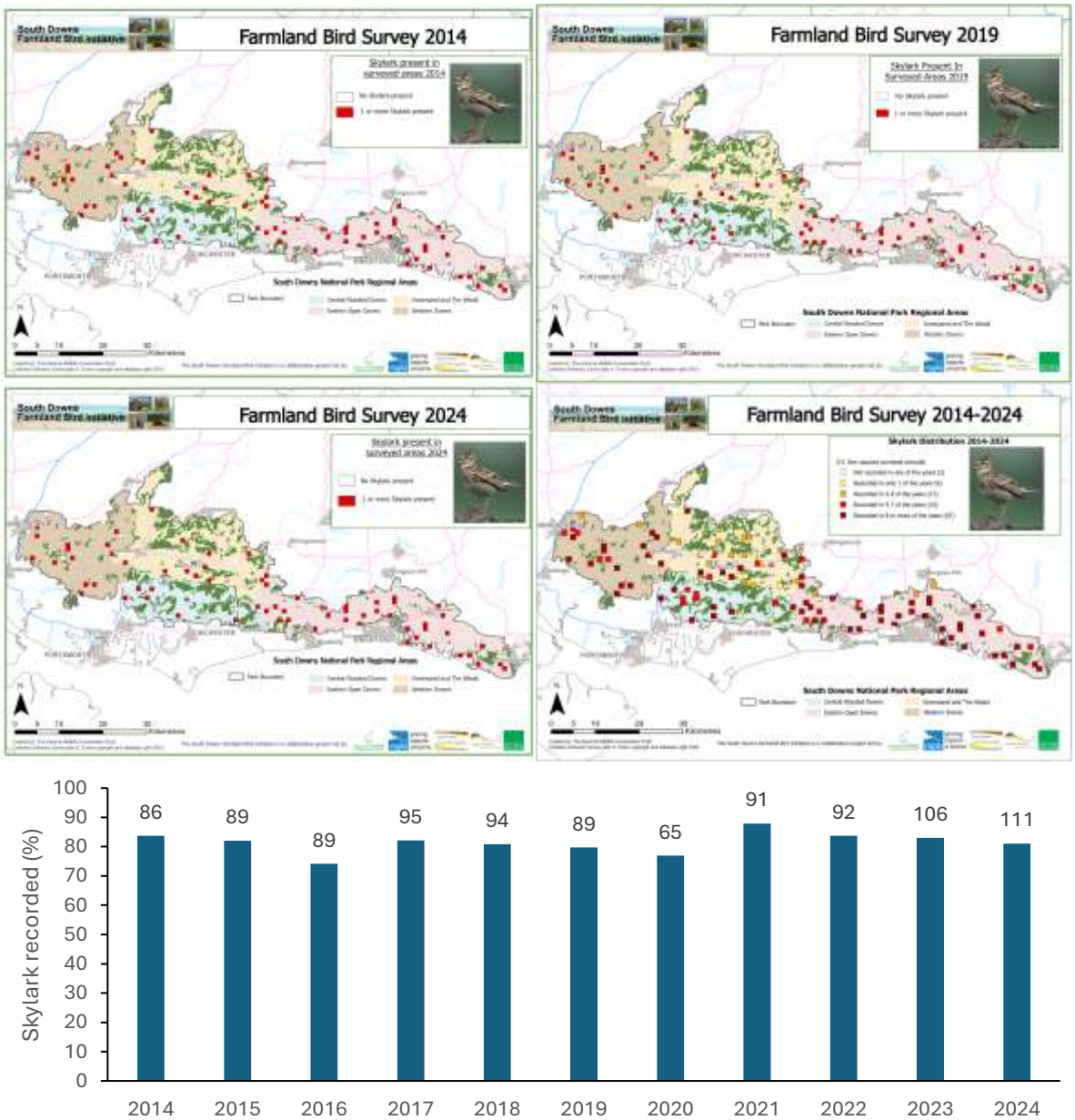


Figure 9. Maps of skylark recorded in the SDFBI monitoring in 2014, 2019, and 2024 and a hotspot map, followed by the yearly percentage of squares where skylark were recorded in the SDFBI monitoring. Data labels are the number of 1-km squares surveyed each year.

The 1-km squares where the highest abundance of skylark was recorded tended to be on the Western Downs or Eastern Open Downs, reflecting this species distribution. Across the eleven years of the SDFBI monitoring, skylarks showed a significant increase of one fifth (20%; 95% confidence intervals: 8.3% to 33%, Figure 10). Where skylarks were recorded in the first three years of the survey there was an average of 8.1 skylarks per 1-km square. In the last three years of the survey there were an average of 8.8 skylarks per square.

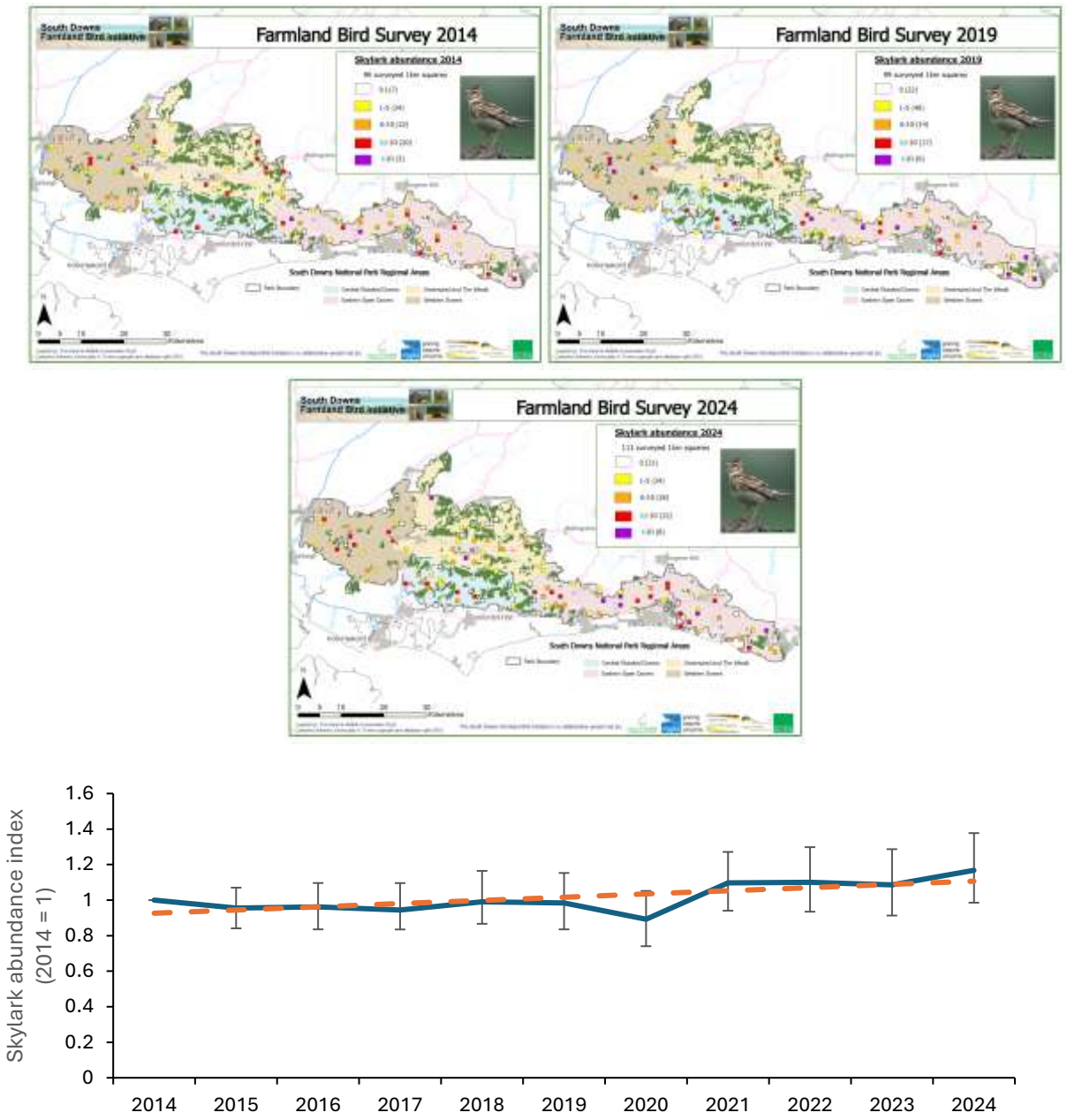
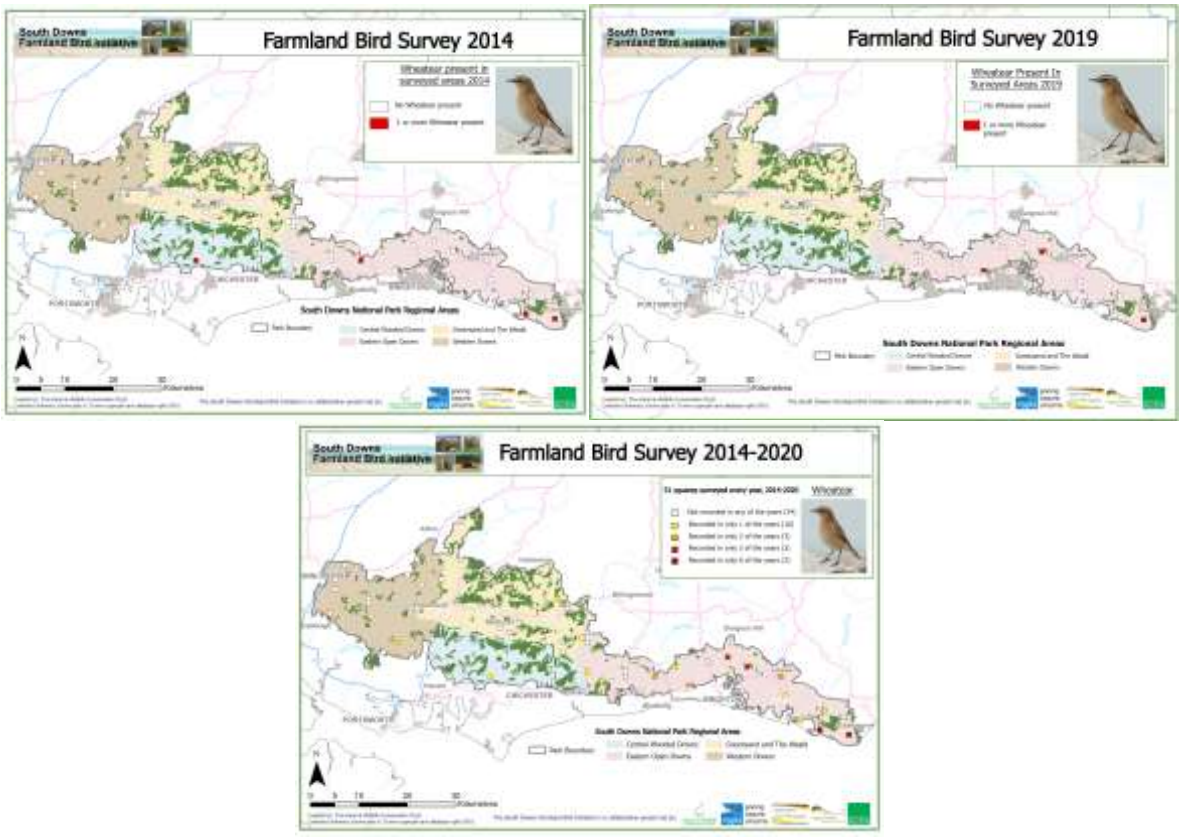


Figure 10. Maps of skylark abundance recorded in the SDFBI monitoring in 2014, 2019, and 2024 and results from the analysis of the population trend in skylark over the course of the SDFBI monitoring. The blue line is the annual index of abundance for skylark, with the long-term trend shown by a dashed red line.

Wheatear

Wheatears are very rarely recorded during the breeding season in the South Downs National Park and the SDFBI monitoring results reflect this. The SDFBI did not monitor wheatear after 2021, but for completeness the results of the monitoring before that (2014-2020) are reported here. On average, wheatears were recorded on 7.9 1-km squares over the course of the seven years they were monitored, too few to reliably test for a population trend (Figure 11). Wheatear occurrence was recorded on an average of 11.4% squares from 2014 to 2016 and 5.9% on average from 2018 to 2020, which seems to indicate a decline in occurrence, although again the number of squares where they were recorded was small.



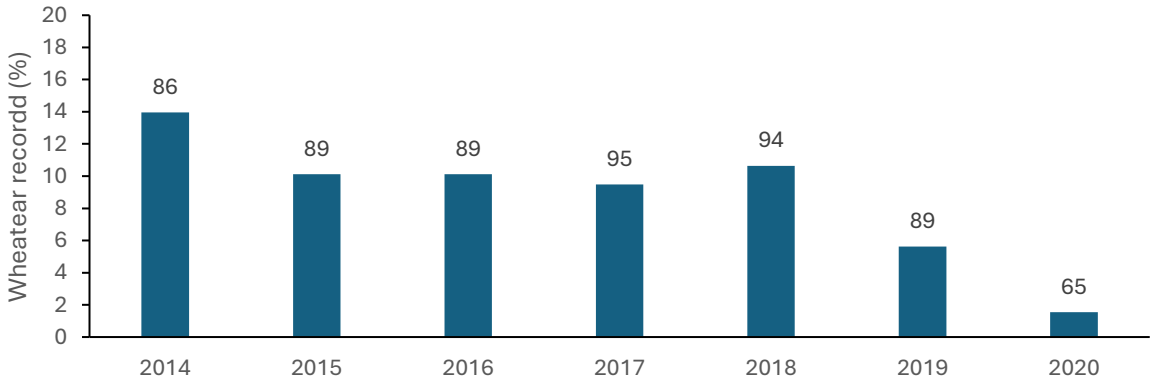


Figure 11. Maps of wheatear recorded in the SDFBI monitoring in 2014, 2019, and 2024 and a hotspot map, followed by the yearly percentage of squares where wheatear were recorded in the SDFBI monitoring. Data labels are the number of 1-km squares surveyed each year.

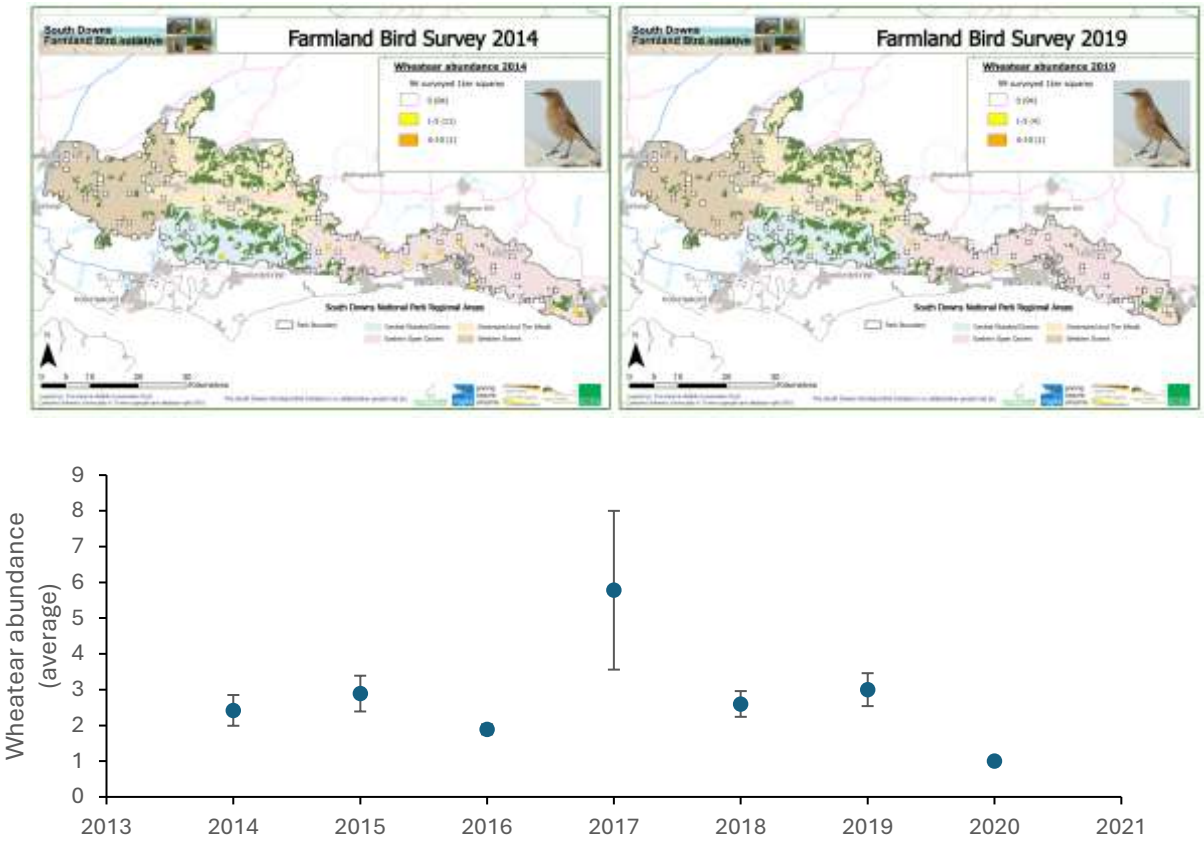


Figure 12. Maps of wheatear abundance recorded in the SDFBI monitoring in 2014 and 2019.

There were, on average, 2.8 (± 0.3) wheatear recorded on the 1-km squares where they were found from 2014 to 2020. In the first three years of the survey there were an average of 2.4 wheatear per square compared to an average of 2.2 from 2018 to 2020, with a noticeable decline in numbers in 2020 (Figure 12).

Meadow pipit

From 2014 to 2024, the SDFBI monitoring recorded meadow pipits on an average of 18.5 1-km squares per year, too few to reliably test for a population trend. On average this represented 20.1% of the squares surveyed. From 2014 to 2016, meadow pipits were recorded on an average of 23.1% of squares, while from 2022 to 2024 they were recorded on an average of 19.6% of squares surveyed, perhaps a small decline (Figure 13). In the SDFBI monitoring, meadow pipits have been found mainly across the Eastern Open Downs of the SDNP, with scattered recordings in the Central Wooded Downs and Western Downs (Figure 13).

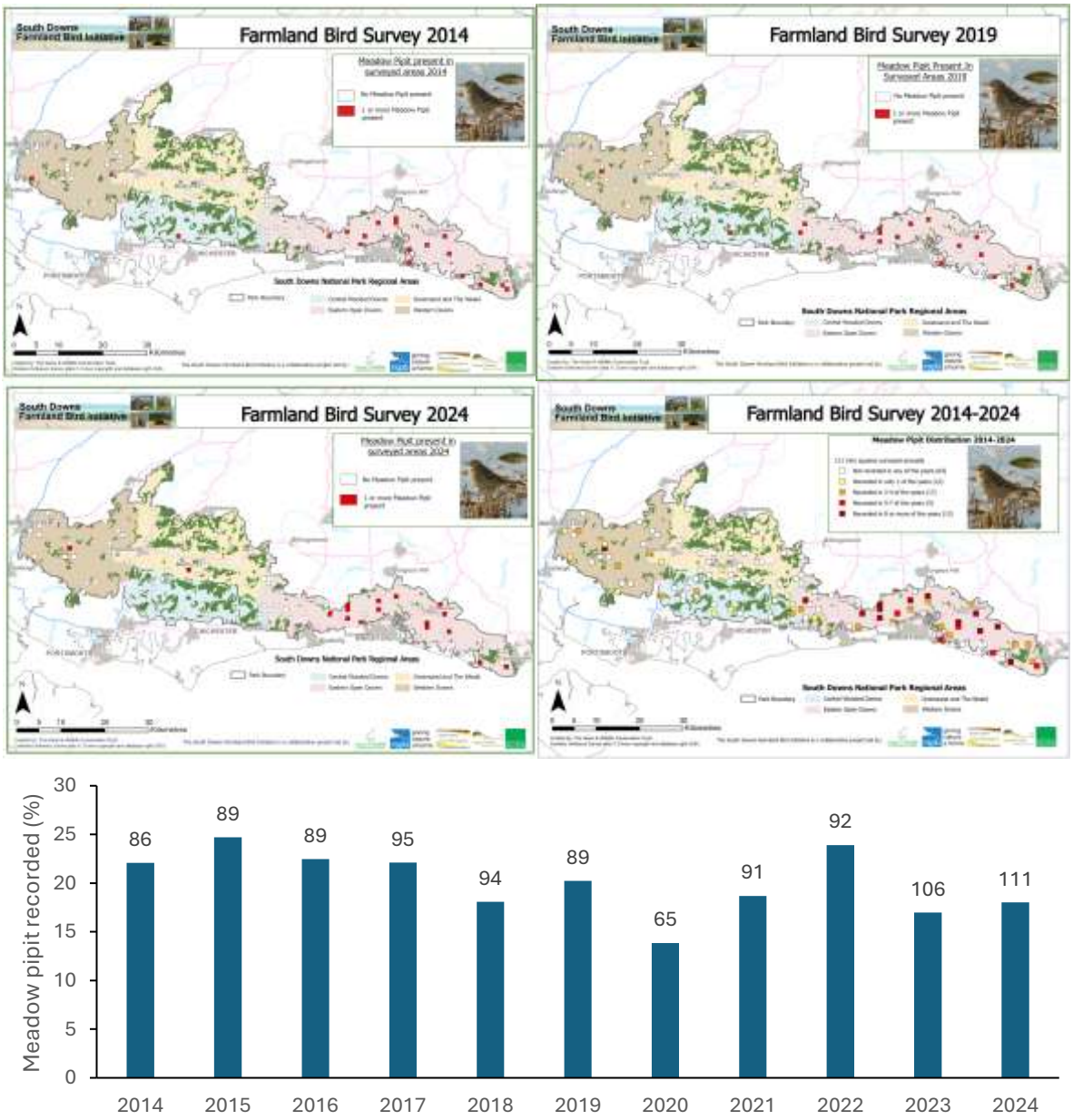
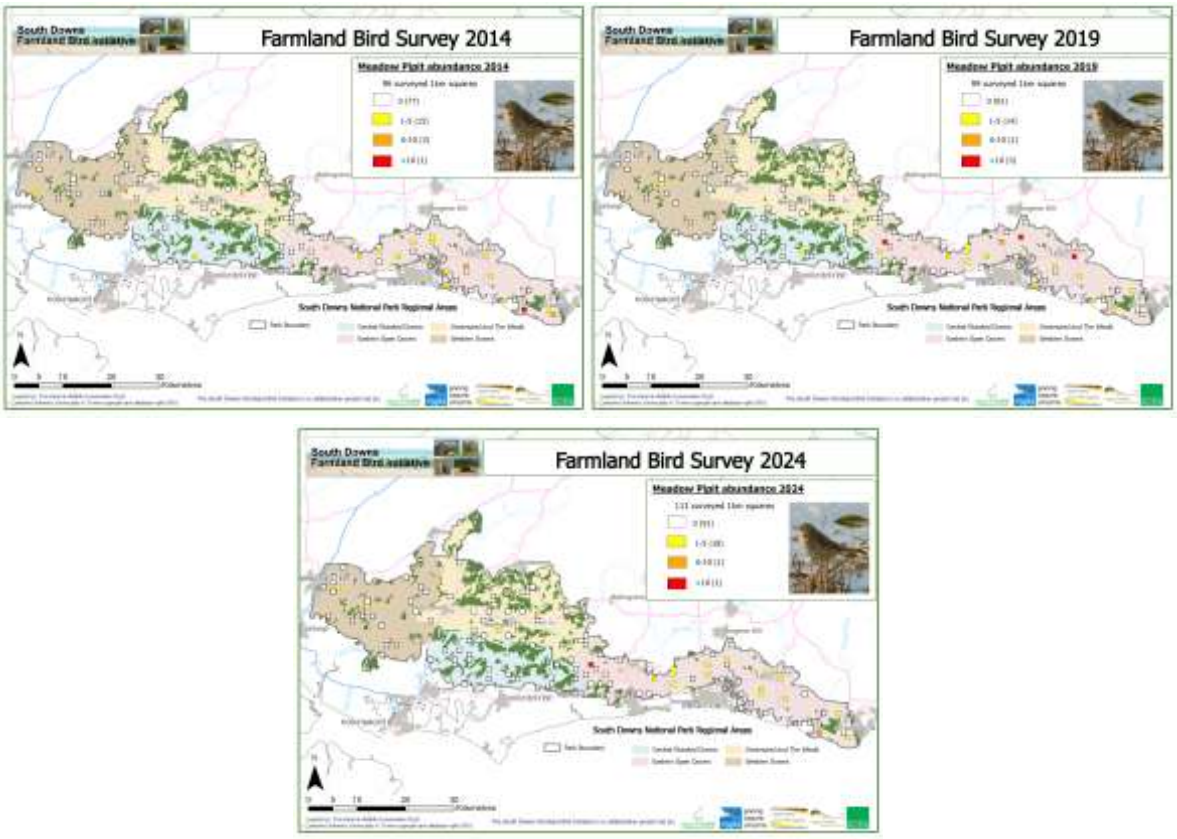


Figure 13. Maps of meadow pipit recorded in the SDFBI monitoring in 2014, 2019, and 2024 and a hotspot map, followed by the yearly percentage of squares where meadow pipit were recorded in the SDFBI monitoring. Data labels are the number of 1-km squares surveyed each year.



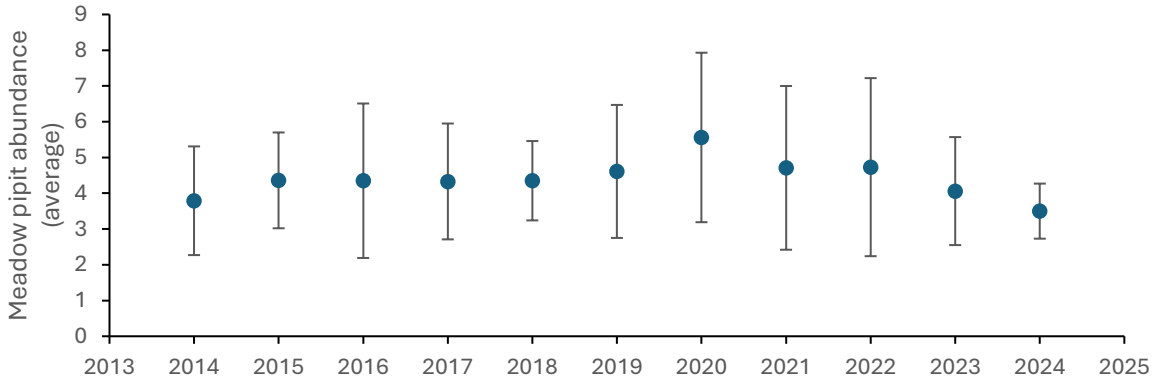


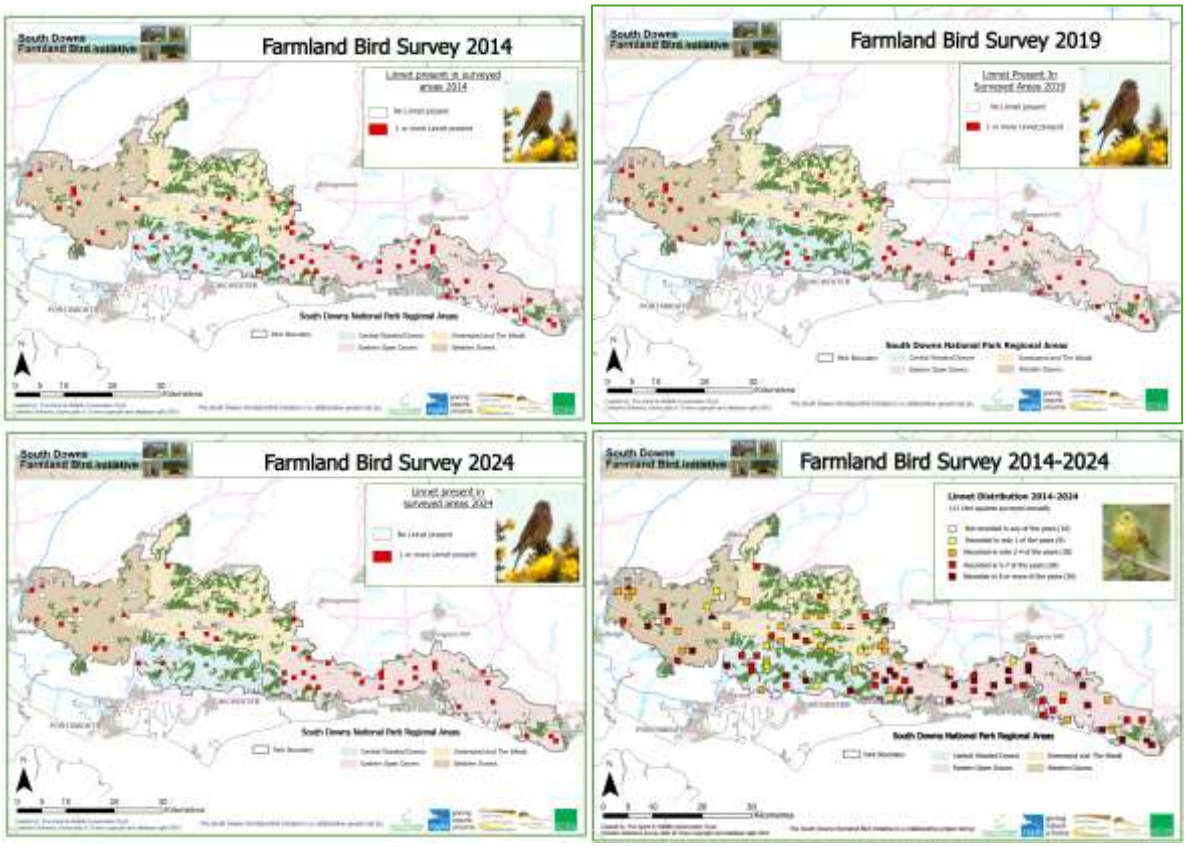
Figure 14. Maps of meadow pipit abundance recorded in the SDFBI monitoring in 2014, 2019, and 2024. The graph displays the average number of meadow pipits on 1-km squares where they were recorded in each year of the SDFBI monitoring. The error bars are ± standard errors.

On average, there were 4.4 (± 0.1) meadow pipits on the 1-km squares where they were recorded from 2014 to 2024. There was an average of 4.2 meadow pipits per square where they were recorded in the first three years of the survey compared to an average of 4.1 in the last three years of the survey, with little change in abundance (Figure 14).

Linnet

Linnet have been recorded from an average of 54.7 1-km squares per year in the SDFBI monitoring (Figure 15). This equates to an average of 59.8% of surveyed squares, with linnet

found on an average of 64.4% of squares from 2014 to 2016 and 56.4% of squares from 2022 to 2024, a decline in occurrence. In the SDNP, linnets are most regularly recorded in the Eastern Open Downs, the Central Wooded Downs, and the Western Downs, with fewer recordings in the Greensand and the Weald.



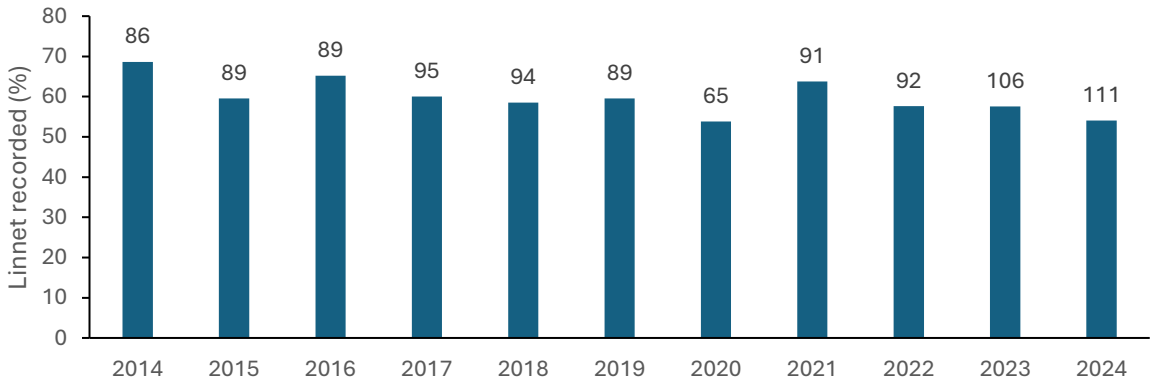
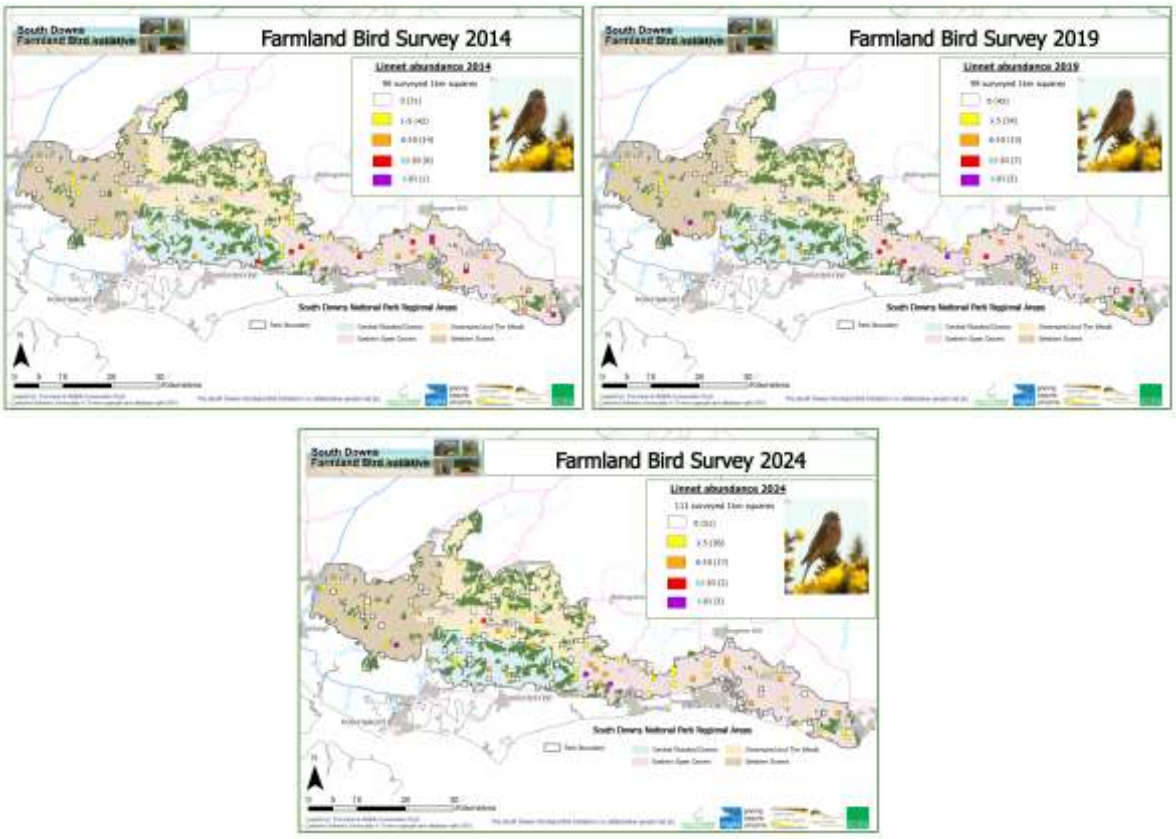


Figure 15. Maps of linnet recorded in the SDFBI monitoring in 2014, 2019, and 2024 and a hotspot map, followed by the yearly percentage of squares where linnet were recorded in the SDFBI monitoring. Data labels are the number of 1-km squares surveyed each year.



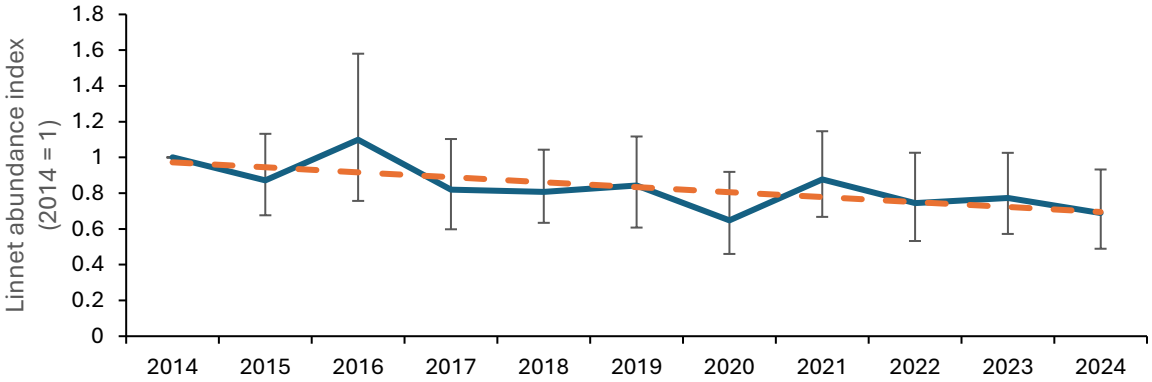


Figure 16. Maps of linnet abundance recorded in the SDFBI monitoring in 2014, 2019, and 2024 and results from the analysis of the population trend in linnet over the course of the SDFBI monitoring. The blue line is the annual index of abundance for linnet, with the long-term trend shown by a dashed red line.

Linnet abundance has tended to be higher in the Eastern Open Downs, especially so in the latter part of the survey period, with one 1-km square on the Western Downs, north of Hambledon, also recording high linnet abundance in 2019 and 2024 (Figure 16). From 2014 to 2024, linnet showed a significant decrease of 28% (95% confidence intervals: -42% to -9.1%, Figure 16). There were an average 6.7 linnet per square where they were recorded in the first three years of the survey compared to an average of 5.8 in the last three years of the survey.

Corn bunting

The SDFBI surveys recorded corn bunting on an average of 16.5 1-km squares per year, with an average of 18% of surveys recording corn bunting. In the first three years of the survey, corn buntings were recorded on 14.4% of squares, with an average of 20.7% in the last three years, an increase (Figure 17). Within the arable areas of the SDNP, corn buntings are mainly found across the Eastern Open Downs, with a small hotspot from north of Chichester near Lavant Down to west of Chichester near Stoke Clump, with scattered records east of Winchester.

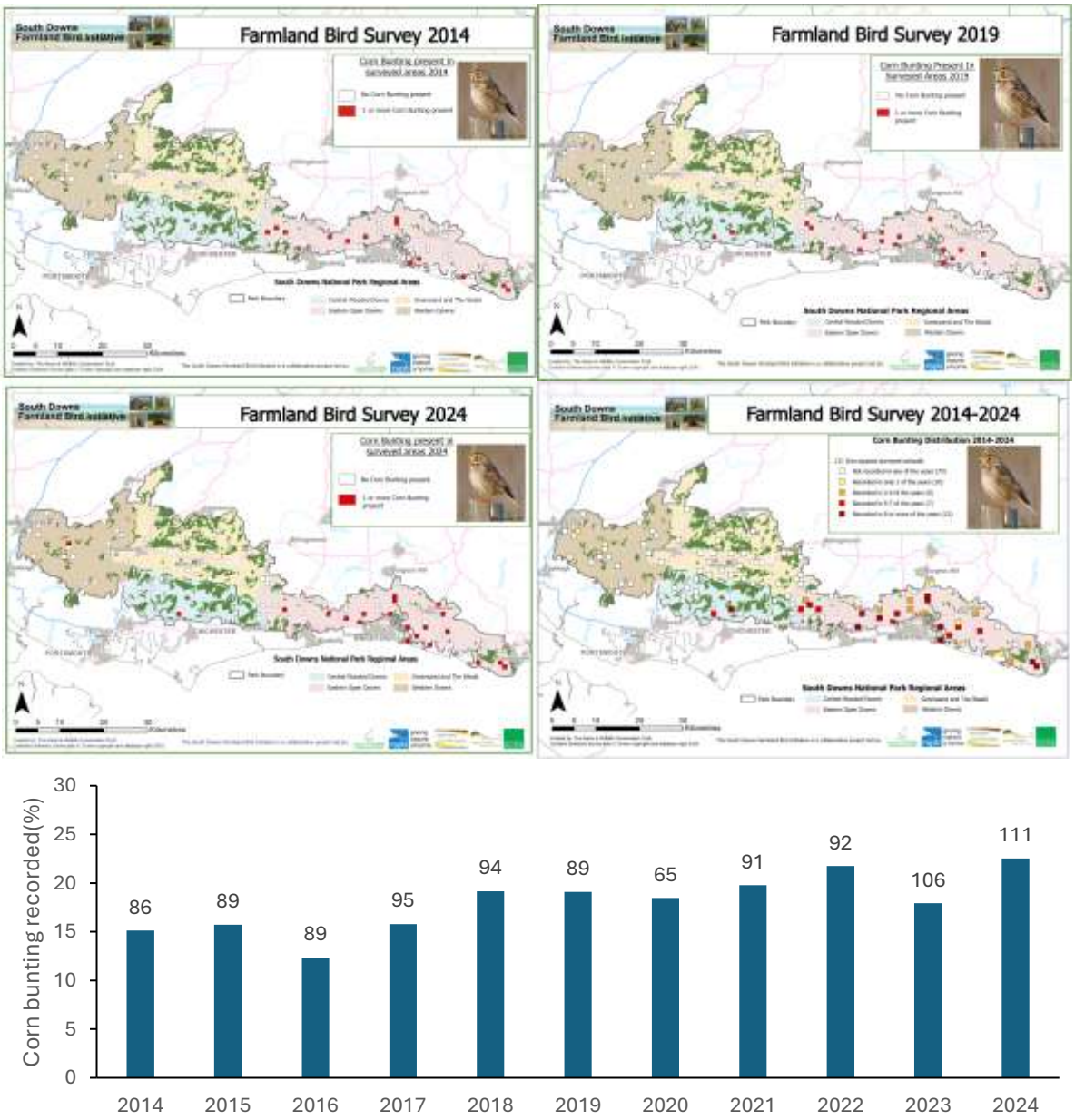
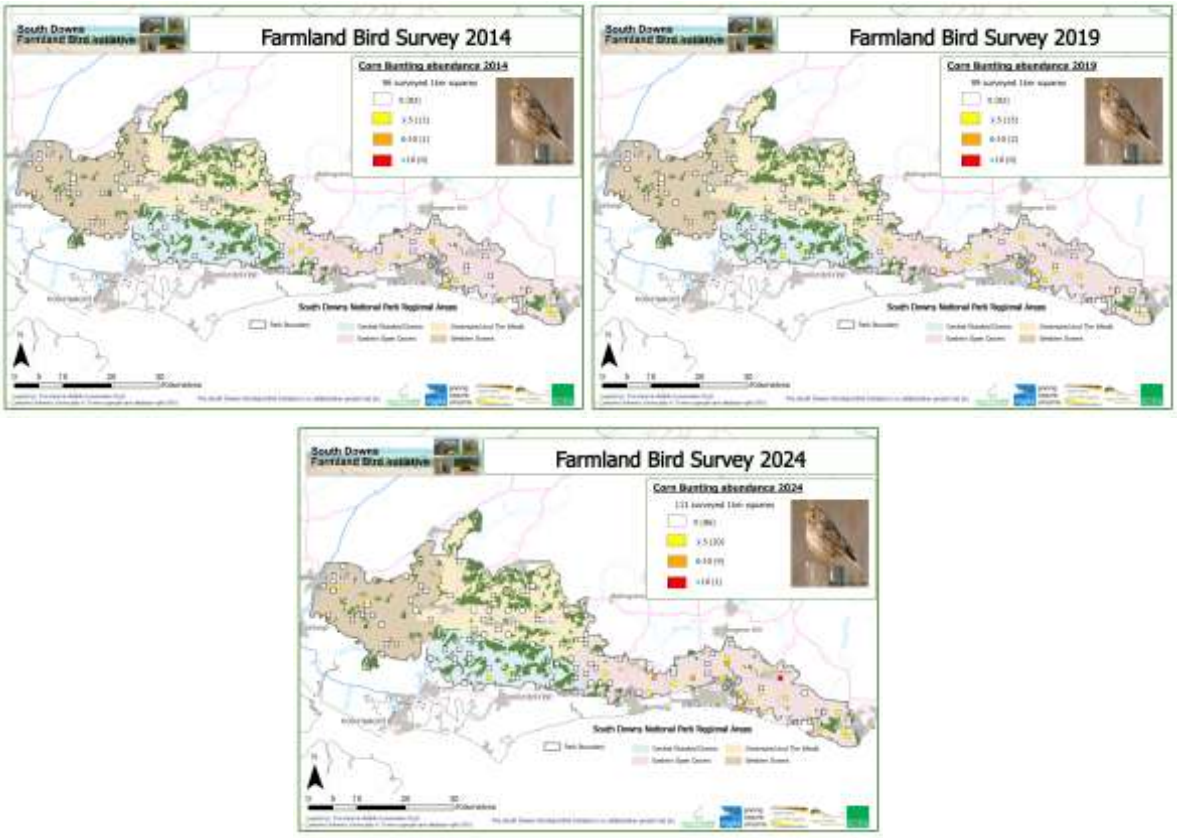


Figure 17. Maps of corn bunting recorded in the SDFBI monitoring in 2014, 2019, and 2024 and a hotspot map, followed by the yearly percentage of squares where corn bunting were recorded in the SDFBI monitoring. Data labels are the number of 1-km squares surveyed each year.

The 1-km squares where the higher numbers of corn buntings were recorded were in the Eastern Open Downs (Figure 18). There was an average of 3.2 (± 0.1) corn buntings on the 1-km

squares where they were recorded from 2014 to 2024. In the first three years of the survey there was an average of 3.9 corn buntings per square where they were recorded compared to an average of 3.5 in the last three years of the survey (Figure 18).



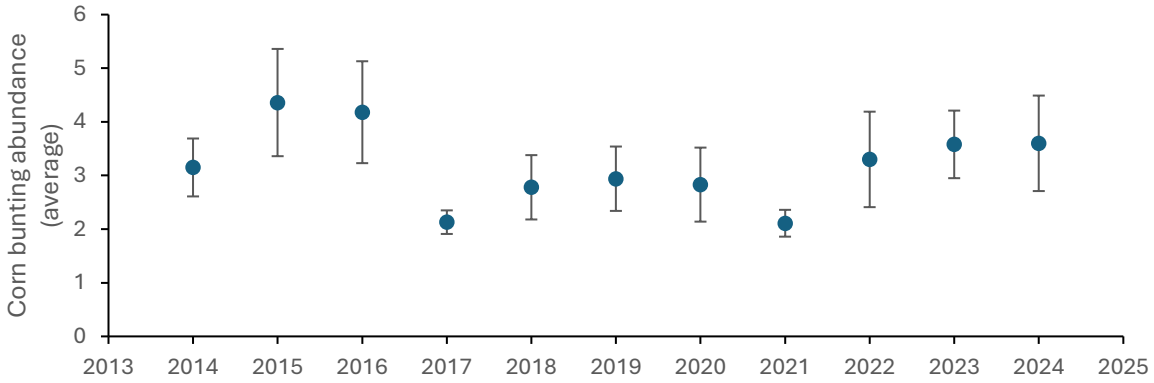


Figure 18. Maps of corn bunting abundance recorded in the SDFBI monitoring in 2014, 2019, and 2024. The graph displays the average number of corn buntings on 1-km squares where they were recorded in each year of the SDFBI monitoring. The error bars are ± standard errors.

Yellowhammer

Yellowhammer were recorded on an average of 54.5 1-km squares in the SDFBI survey. This resulted in an average of 59.6% of surveyed areas, with yellowhammer recorded in 62.6% squares in the first three years of the survey, and 57.6% squares in the final three years of the

survey (Figure 19). Yellowhammer are found throughout the SDNP, with surveys on the 1-km squares in the Western Downs particularly likely to record this species. They are also commonly found in the Central Wooded Downs and the Eastern Open Downs, although they are not as common on the extreme eastern end of the Eastern Open Downs. In fact, no yellowhammer was recorded east of Lewes in 2024.

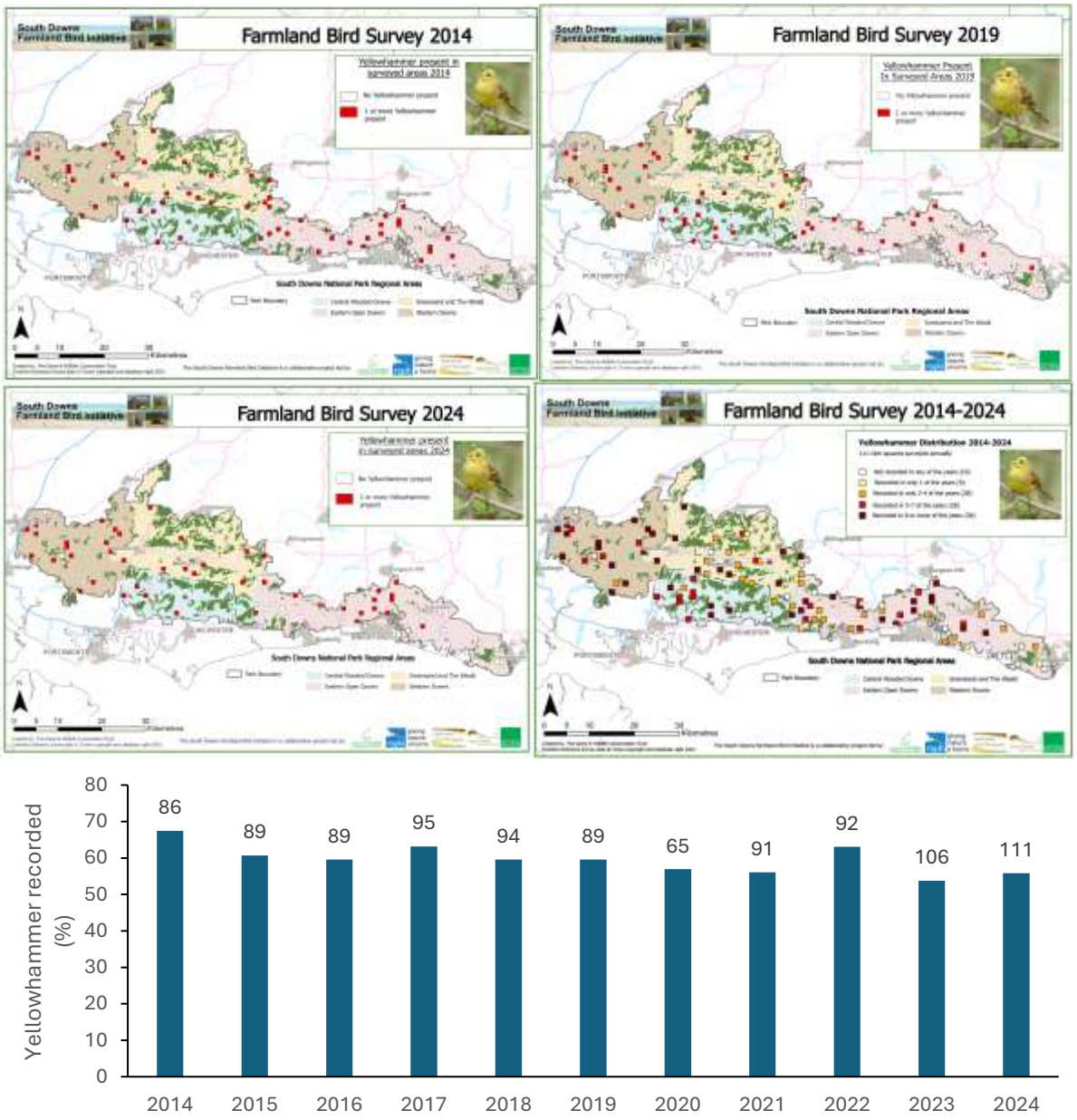
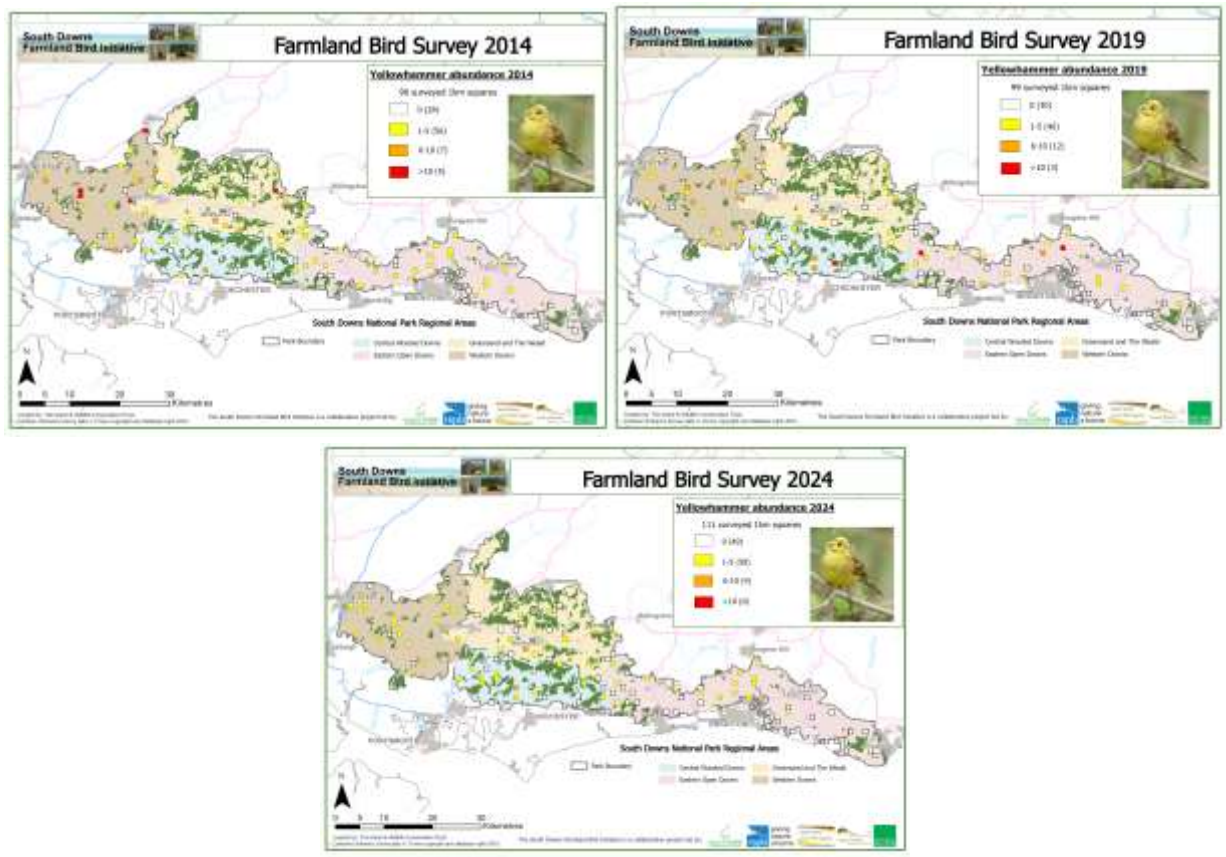


Figure 19. Maps of yellowhammer recorded in the SDFBI monitoring in 2014, 2019, and 2024 and a hotspot map, followed by the yearly percentage of squares where yellowhammer were recorded in the SDFBI monitoring. Data labels are the number of 1-km squares surveyed each year.



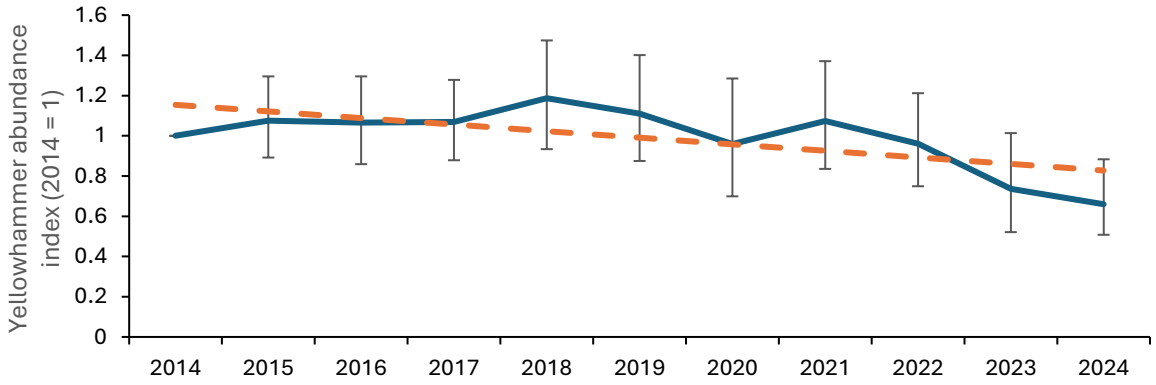


Figure 20. Maps of yellowhammer abundance recorded in the SDFBI monitoring in 2014, 2019, and 2024 and results from the analysis of the population trend in yellowhammer over the course of the SDFBI monitoring. The blue line is the annual index of abundance for yellowhammer, with the long-term trend shown by a dashed red line.

In 2014, yellowhammer abundance was higher towards the west of the SDNP, reflecting the distribution of the species, with little subsequent pattern in abundance (Figure 20). Yellowhammer abundance showed a significant decrease of 31% (95% confidence intervals: -47.0 % to -9.0%, Figure 20) across the eleven years of the survey. There was an average of 3.5 yellowhammer per square where they were recorded in the first three years of the survey compared to an average of 3.0 in the last three years of the survey.

Red-listed species

Six red-listed species are recorded in the SDFBI monitoring. The maps below indicate how many red-listed species were recorded on the 1-km squares across the SDNP (Figure 21). There is again some indication of the "hotspot" associated with the Duke of Norfolk's Peppering Project, with the 2014 and 2019 maps showing this area with the highest number of red-listed species recorded in the SDFBI.

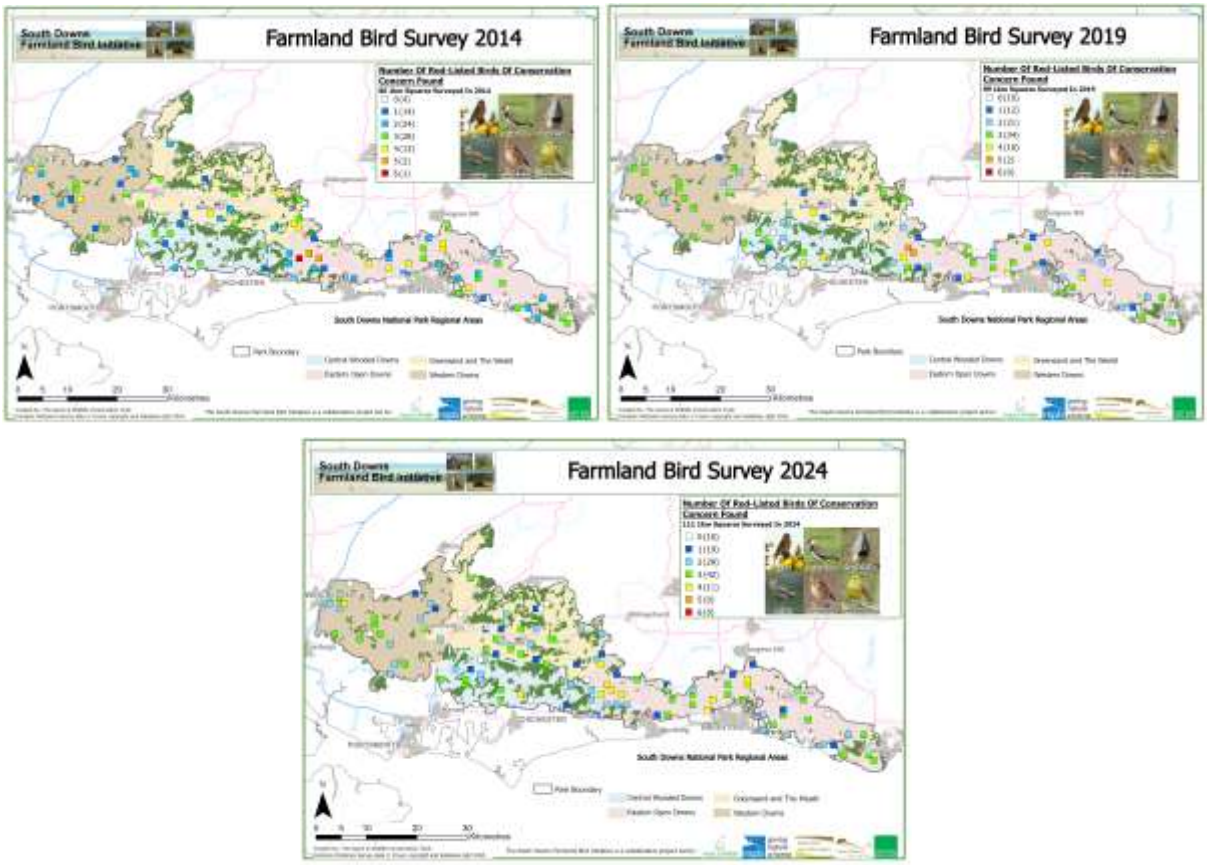


Figure 21. Maps of the number of red-listed species recorded per 1-km square in the SDFBI monitoring in 2014, 2019, and 2024. Dark blue indicates 1-km squares where only one red-listed species was recorded in a year, while red indicates where all six red-listed species were recorded.

Discussion

How do the results from the SDFBI monitoring compare to those from national, regional, and county-level monitoring? Most of the data for the conservation status of birds comes from the Breeding Bird Survey (BBS), run by a consortium of the British Trust for Ornithology (BTO), the Royal Society for the Protection of Birds (RSPB), and the Joint Nature Conservation Committee (JNCC). The most recent results from the BBS cover the survey up to and including 2023 (Heywood et al., 2024). The yearly BBS reports cover population trends for the UK, England and, where sufficient data has been collected (an average of 30 squares per year on which the species was recorded), the southeast of England. The most comparable trends provided by the BBS report cover ten years 2012 to 2022 and that is what we will consider in what follows. Local to the SDNP, the Hampshire Ornithological Society (HOS, 2024) and the Sussex Ornithological Society (SOS, 2024) use information collected for the BBS survey, in addition to other information, to summarise the situation for individual species conservation in their respective counties. And finally, the GWCT Partridge Count Scheme (PCS, Ewald et al., 2009) records data for grey partridges collected from volunteers on farms across the UK and calculates long-term trends in numbers of grey partridge spring pairs both nationally and regionally – with southern England the region holding the SDNP – reported in semi-annual newsletters to PCS members. Here we compare results from other resources to the results reported here in the SDFBI. By and large, the results from the SDFBI are in line with what has been reported from the BBS and the PCS.

Grey partridge

Grey partridges are red-listed, and their numbers have declined over the long term in the UK, with a 92% decline from 1967–2022 (BTO 2024, see 2023 BTO Bird Trends Explorer). Numbers have declined over the ten years (2012 to 2022) where trends are available across the UK (-19%*[1]) and England (-21%*), with insufficient records to calculate a ten-year trend in southeast England – although there are indications of a significant decline from 2022 to 2023 (-50%*).

The GWCT's PCS uses a different method to monitor numbers, with surveys undertaken across a farm, using a 4-wheel drive vehicle as a moving hide (Ewald et al., 2009). This method attempts to monitor all grey partridge spring pairs on a farm and is believed to give a better estimate of grey partridge pair density as it takes place before crops reach heights that obscure grey partridges – a bird that can be difficult to survey using the transect-based system adopted by the SDFBI survey. The spring pair density from PCS members in the south of England in 2014 to 2024 (Figure 22) showed a stable density, with a small increase in the grey partridge spring pair density latterly. The members of the PCS have an interest in grey partridge conservation and the numbers recorded on their areas reflect this – something that is not the case across the SDNP, though is the case on the Duke of Norfolk's Peppering Project. Comparing the actual

[1] * Indicates statistically significant change.

numbers recorded is not possible due to the difference in survey technique but it does underline that where conservation management is prioritised for grey partridge numbers can be maintained, though there may be year-on-year variation due to weather etc.

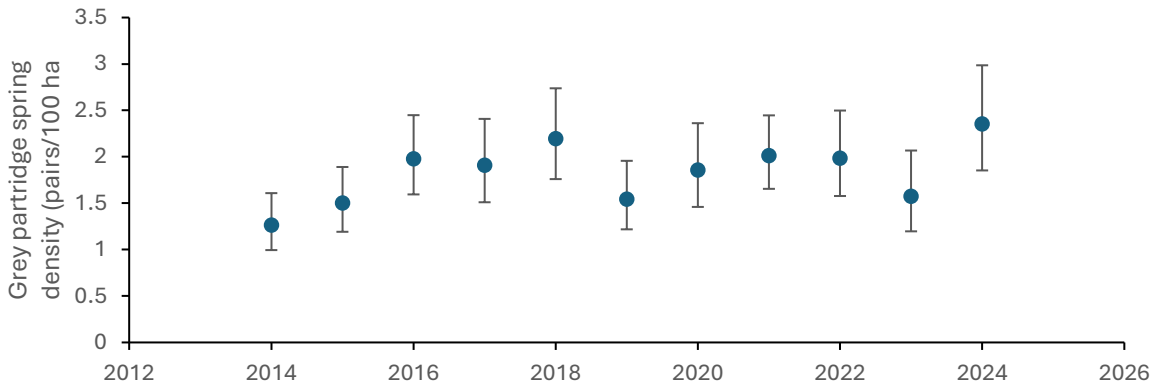


Figure 22. Grey partridge pairs per 100 ha in southern England on land managed by members of the GWCT's PCS. The error bars are 95% confidence intervals.

The HOS report indicates that many grey partridges recorded on count areas in Hampshire may be associated with releasing, while the SOS report highlights the Duke of Norfolk's Peppering Project as a site holding most grey partridges reported in Sussex. Grey partridges recorded in the SDFBI surveys are almost entirely found on the Duke of Norfolk's Peppering Project so reflect the situation on the estate. What is more concerning is the lack of grey partridges recorded outside the project area – indicating a need for the wider take-up of practical conservation measures. The area managed within the Peppering Project has increased, this may allow grey partridges to spread further throughout the SDNP, but more areas need to undertake habitat management for the species.

Lapwing

Lapwing are red-listed, and their numbers have declined over the long term in the UK, with a 62% decline in their breeding season numbers from 1967–2022 (BTO 2024, see 2023 BTO Bird Trends Explorer). Numbers have declined over the ten years where trends are available (2012 to 2022) across the UK (-13%*), England (-17%*), and southeast England (-47%*). The SOS report indicates a decline in the reports of lapwing, compared to long-term averages, with lapwing reported breeding across Hampshire by HOS. The lapwing results from the SDFBI do indicate a long-term decline, indicating the need for expanded conservation efforts. Again, lapwing reports in the SDFBI indicate a hotspot partially coincident with Duke of Norfolk's Peppering Project area – with the possibility that increases in the area managed may be beneficial to lapwing.

Red kite

Red kites are green-listed, and their numbers have increased over the long term in the UK, with a 2232% increase from 1995–2022 (Heywood et al., 2024). Numbers have increased over the

ten years where trends are available (2012 to 2022) across the UK (+199%*), England (+170%*), and southeast England (+92%*). In Hampshire, HOS reported an increase in the number of 1-km squares where red kites were reported – with red kites being the most reported bird of prey in the county. SOS reported records from an increased number of tetrads. In summary, red kites are well established across the SDNP and there is little cause for alarm regarding their conservation.

Buzzard

Buzzards are green-listed, and their numbers have increased over the long term in the UK, with an 80% increase in their breeding season numbers from 1995–2022 (Heywood et al., 2024). Numbers have been stable over the ten years where trends are available (2012 to 2022) across the UK (+1%), have increased slightly in England (+10%*), and remained stable in southeast England (+12%). In Hampshire, buzzards were the second-most widespread bird of prey – after red kites, with SOS reporting records from an increased number of tetrads, both reflecting data from 2023. Again, based on the above and the SDFBI results, buzzards are widespread throughout the SDNP and there is little cause for alarm regarding their conservation.

Skylark

Skylarks are red-listed, and their numbers have declined over the long term in the UK, with an 11% decline from 1995–2022 (Heywood et al., 2024). However, numbers have increased over the ten years where trends are available (2012 to 2022) across the UK (+15%*), and in England (+11%*), whilst remaining stable in southeast England (+21%). The population trend reported in southeast England is remarkably similar to the 20% increase seen in the SDFBI figures. In Hampshire, HOS reported the species as declining. However, SOS considered that the Sussex BBS graph illustrating changes in number from 1994 to 2023 skylark was indicative of a slow recovery in numbers of skylark – with the index for 2021 to 2023 higher than that from 2014 to 2019. The results from the SDFBI and SOS are encouraging as they may indicate a change in the fortunes of skylark, with conservation efforts starting to pay off.

Wheatear

Wheatear are an amber-listed species, and their numbers have declined over the long term in the UK, with a 32% decline from 1995–2022 (Heywood et al., 2024). Numbers have decreased over the ten years where trends are available (2012 to 2022) across the UK (-32%*) and in England (-40%*), with insufficient records to calculate a ten-year trend in southeast England. HOS reports that 2005 was the last time Wheatear were known to breed in Hampshire. SOS reports only one location of confirmed breeding in recent years – Rye Harbour, but no evidence of breeding in 2023. The lack of reported breeding wheatear supports the decision to stop recording wheatear in the SDFBI monitoring following 2020.

Meadow pipit

Meadow pipits are amber-listed, and their numbers have declined over the long term in the UK, with a 13% decline from 1995–2022 (Heywood et al., 2024). Numbers have remained stable over the ten years where trends are available (2012 to 2022) across the UK (+4%) but have decreased across England (-13%*), and southeast England (-17%*). HOS reports that meadow pipits are a declining resident, with SOS reporting confirmed breeding in only nine tetrads, with probably breeding in another 18 tetrads.

Linnet

Linnets are red-listed, and their numbers have declined over the long term in the UK, with a 23% decline from 1995–2022 (Heywood et al., 2024). Numbers have remained stable over the ten years where trends are available (2012 to 2022) across the UK (+1%), England (-3%), and southeast England (+2%). HOS considered the breeding status of linnet uncertain – as the Hampshire Bird Atlas (2007-2012) reported breeding linnet 652 tetrads. This was despite reports of confirmed breeding 12 tetrads spread across Hampshire, with probable breeding on 132 tetrads in 2023 –similar to figures reported in the previous year (2022). SOS reported confirmed linnet breeding in only seven tetrads, with probably breeding in another 64 tetrads.

Corn bunting

Corn buntings are red-listed, and their numbers have declined over the long term in the UK, with an 83% decline in their breeding season numbers from 1967–2022 (BTO 2024, see 2023 BTO Bird Trends Explorer, BTO 2024). Numbers have increased over the ten years where trends are available (2012 to 2022) across the UK (+39%*), England (+35%*), and southeast England (+66%*). HOS reported similar numbers of singing male corn buntings in 2023 versus 2022 while SOS reported a similar number of tetrads with corn bunting during the breeding season.

Yellowhammer

Yellowhammers are red-listed, and their numbers have declined over the long term in the UK, with a 64% decline in their breeding season numbers from 1967–2022 (BTO 2024, see 2023 BTO Bird Trends Explorer). Numbers have decreased over the ten years where trends are available (2012 to 2022) across the UK (-19%*), England (-18%*), and southeast England (-19%*). HOS reported an increase in yellowhammer distribution in Hampshire. SOS reported that the Sussex BBS graph, illustrating changes in yellowhammer numbers from 1994 to 2023, showed a continued decline, though possibly at a slower pace than in the later part of the 1990s, into the early 2000s.

Conservation implications

Species-specific research directed towards the conservation of farmland birds highlights the importance of chick-food resources (with many species reliant on invertebrate food in the first

few weeks post-hatching – grey partridge, corn bunting, yellowhammer), while the mosaic of habitats within the landscape, as well as overwintering resources is also important.

The hotspot associated with the Duke of Norfolk's Peppering Project highlights the positive effect of the conservation activities carried out there (Ewald et al., 2012; Potts, 2012). Effort has been made in the Peppering Project to provide chick-food resources in the breeding season, with conservation headlands and wildflower mixes. These can provide both insects and seeds/green shoot food resources depending on how they are managed (Smith et al., 2020; Sotherton, 1991). Nesting cover was provided when fields were split in two by beetle banks, with hedgerows established on most of these – providing both nesting cover and food resources (Holland et al., 2014; Thomas et al., 1992). Food resources overwinter have been provided using winter food mixes (Henderson et al., 2004). Effort is made to provide a network of habitats across the Project area, with nesting habitat and food provision in proximity (McHugh et al., 2022). The cropping on the Peppering Project follows a patchwork approach – with effort to avoid block cropping, thus providing another element of landscape diversity (Sirami et al., 2019). The conservation habitat (conservation headlands, beetle banks, wildflower mixes) covers just over 15% of the arable area in the Peppering Project area. Habitat management is combined with legal predator control – which is known to provide support for ground-nesting birds, in particular grey partridges (Tapper et al., 1996).

Many farms across the SDNP have provided similar habitats to those on the Peppering Project, but not on the same scale or with the same level of legal predator control. The question is how much conservation habitat is needed within a farm and how many farms need to provide this habitat to turn the fortunes of farmland birds around? And how important is the provision of predator control in the Peppering Project in the results reported on the project area?

Regarding the first of these questions – how much we need per farm and what proportion of farms need to provide habitats at which level - there has been some modelling research exploring this, using data from the BBS survey across England, in conjunction with information on the agri-environmental options that farmers provide across the country (Sharps et al., 2023). The axiom regarding models should of course be borne in mind when considering the results of this. "All models are wrong, but some are useful.[2]" This research explored first the level of provision on a local area and its effect on avian population growth rates. Farm level provision was divided into high AES provision ('higher-tier': average bird-friendly option cover = 7.4%), low AES provision ('lower-tier': 2.3%) and no bird-friendly AES ('no AES'). The analysis also compared the effect in different landscapes across England, arable (East Anglia, mixed (Oxfordshire), and pastoral (West Midlands). In arable and pastoral landscapes, a significant effect was seen in avian growth rates calculated from the BBS dataset, with higher growth rates on holdings with high AES provision compared to no provision – but unfortunately not in mixed landscapes. Sharp et al. (2023) went on to model the result of increasing the proportion of the landscape that would need to provide high AES provision. Their results indicated that, to

[2] Attributed to British statistician George Edward Pelham Box, FRS.

increase regional farmland bird populations by 10% over 10 years, 47% and 26% of the farmed landscape would need to be devoted to high AES provision agreements in arable and pastoral landscapes respectively. Less of the farmed landscape would need to be in high AES provision agreements if these were targeted to where priority birds are found and less still if there was low AES provision on the remainder of the farmed landscape. So, with a targeted approach, 29% and 10% of the farmed landscape would need to be devoted to high AES provision agreements in arable and pastoral landscapes respectively when 30% of the farmed landscape is also devoted to lower AES provision. This sounds helpful but the caveat is that the landscape across the SDNP is varied, with the Eastern and Western downland areas separated by a more mixed central area of the park.

What does this suggest for the farmed landscape within the SDNP? The level of habitat provision on a holding that is considered high by Sharp et al. (2023) is half the level of provision recorded in the Peppering Project. It does reflect the level of provision suggested as necessary by Winspear et al. (2010) who devised a Farmland Bird Package for the AES, outlining the need for habitat provision that provided resources for chick food resources in summer, nesting habitat and overwinter food and cover. If we consider the SDNP an area of arable farming, the results from Sharp et al. (2023) suggest that with roughly 30% of the farm holdings in the SDNP providing the high AES level, targeting where farmland bird species are known to occur, and with another 30% of farm holdings providing the low AES level, it should be possible to increase regional farmland bird populations by 10% over 10 years. Results for a mixed landscape, which reflects at least parts of the SDNP, are however less certain.

Could legal predator control help restore the fortunes of ground-nesting birds? It is part of the successful restoration of grey partridges (a ground-nesting farmland bird) on the Peppering Project. Comparisons of national bird population trends from ten European countries between species nesting strategy (ground-nesting versus other), Annex I designated (yes/no) and agricultural breeding habitat (yes/no) found additive effects of nesting strategy, designation, and breeding habitats on the likelihood of population decline (McMahon et al., 2024). Ground-nesting birds were 86 % more likely to decline than birds with other nesting strategies. The authors point out that multiple strategies will be needed to restore populations of declining ground-nesting birds, including the development of predation management tools. This could include the use of legal lethal predator control, or it could involve other means of predator management. For those farms where the provision of legal predator control is not an option the answer might be to consider how to mitigate predation events on ground nesting birds. Nest protection is one alternative (Smith et al., 2011). Another solution could be habitat management that provides 20-m plus nesting resources – which can help to protect ground-nesting species (Laux et al., 2024). It is likely that a combination of approaches will be needed but some consideration of predation mitigation will need to be considered, in addition to AES habitat provision on a wider scale and with greater provision at the farm scale.

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