

**BTO Research Report No. 300** 

# Pilot work to assess bird occurrence and abundance on BBS squares within ESAs

David Noble & Stuart Newson

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British Trust for Ornithology The Nunnery, Thetford, Norfolk IP24 2PU Registered Charity No. 216652 David Noble & Stuart Newson

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### **EXECUTIVE SUMMARY**

- 1. Because agri-environment schemes such as Environmentally Sensitive Areas (ESAs) and Arable Stewardship (AS) are designated and taken up on broad geographic scales, they are particularly suited for monitoring by broad-scale biodiversity survey programs. This report assesses the feasibility of using the BTO/RSPB/JNCC Breeding Bird Survey (BBS), which collects information on populations of breeding birds on more than 2000 UK sites annually, to monitor changes in populations of common breeding birds in ESAs in England and Wales.
- 2. Of 1782 BBS squares surveyed in England in 1999, 193 (11%) coincide with ESAs, and most of these (7% of total) include land under agreement. Analyses of species coverage show that between 48 and 59 species (on ESAs and ESA agreement land) occur at enough sites to assess population trends. In Wales, nine species could be monitored on ESAs. BBS routes are line transects, and by digitising the area up to 100m from the transect line, we were also able to assess species coverage on transect sections that coincided with ESA at a much higher resolution. This suggested a lower number of species (16) but further work would be required to develop analyses that take into account non-independence between transect sections.
- 3. Results show that a relatively large number of common species could be monitored on ESAs, and population trends reliably compared to population trends on random squares outside ESAs. However, more sites are required to effectively monitor some of the less abundant species, and there are noticeable gaps in coverage. One way of effectively monitoring a wider range of species and assessing population trends in some of the large northern and western ESAs currently poorly covered would be to develop a bolt-on to the BBS using the same methods. By using random selection of squares in target areas that match BTO regions, this would not affect the stratified random sampling design of the BBS. It might, however, be necessary to support field surveys because these tend to be areas with low volunteer availability.

### 1. INTRODUCTION

To date, bird monitoring by MAFF/DEFRA in English agri-environment schemes has been focused on ESAs from less than annual breeding surveys of mainly wet grassland and uplands. More limited surveys of wintering farmland birds have also taken place, including a farm scale evaluation of the Arable Stewardship pilot. During discussions on a future strategy for a more comprehensive evaluation of agri-environment schemes, attention was turned to the potential value of data generated from annual and occasional bird surveys.

The main aim of this study is to assess the level of coverage on ESAs that is currently achieved by the BTO/JNCC/RSPB Breeding Bird Survey (BBS) organised by the BTO. This survey, introduced in 1994 as an annual UK-wide census, is carried out by volunteers in randomly-selected 1 km squares and provides annual population indices for more than 100 widespread species of birds in the UK. In this study we look at BBS coverage across all ESAs in England and Wales and within individual ESAs. We also examine the value of restricting BBS coverage to those parts of the survey route that exactly coincide with ESA designated land. The current distributions of a number of other bird surveys organised by the BTO are also presented in order to assess their potential for monitoring birds on ESAs.

### 2. METHODS

#### 2.1 Determining species occurrence and abundance on BBS squares in ESAs

Images showing the location and boundaries of ESAs and in the UK were provided in Arcview/GIS by the Rural Development Service Geographic Information Unit of the Department for the Environment, Food and Rural Affairs (DEFRA). Within ESAs, a proportion of land is under agreement depending on whether farmers or landowners within the ESA sign up to the scheme. A further image file showing the location of ESA agreement land in England was provided.

All BBS squares that coincided with land within ESAs and such land under management agreement were identified within Arcview/GIS (ESRI 1996) and BBS bird data for these squares extracted using a program written in SAS (SAS Institute, Inc. 1996). A further SAS program was used to determine the number and proportion of BBS squares occupied by each species and the mean, standard deviation of the mean, maximum and total number of each species recorded across squares within ESAs and ESA agreement land in England. In a second phase of the study, the feasibility of monitoring bird populations on individual ESAs was examined by determining the number of BBS squares within these. Although we normally restrict reporting of BBS trends to species surveyed on a mean of 30 or more squares (Noble *et al.* 2001), this is not possible within an individual ESA. However, to provide some crude measures of changes in abundance, summary information was calculated as above and presented by ESA for species occurring on 10 or more BBS squares.

### 2.2 Occurrence and abundance at the transect section level

The BBS field protocol requires that birds are recorded in each of ten 200 m transect sections, in three distance categories either side of the line (0-25 m, 25-100 m & >100 m), as illustrated in Figure 1. Management prescriptions in agri-environment schemes are often specific to particular parts of farms and land use types (e.g. crop type). To monitor changes in bird populations at this resolution, analysis of bird data at the transect section level is required. For this analysis, records were restricted to those within 100 m of the transect line, to reduce the possibility of double counting birds on the return route through the square. To identify which transect sections intersected ESA and ESA agreement land, transect sections that overlapped by 50% or more with ESA and ESA agreement land were then identified. A SAS program was used to produce species summaries as in section 2.1 for ESA and ESA agreement land at the transect section level. Species occurring on 300 or more transect sections were identified, although it must be stressed that this is an arbitrary cut-off point and is not directly equivalent to 30 BBS squares.

### 2.3 Extent of other bird monitoring on ESAs

Although the BBS is the most comprehensive and currently the most appropriate survey for monitoring numbers of breeding birds on ESAs, there are a number of other surveys organised by the BTO and its partners which may cover ESAs. As a first step towards assessing the level of bird monitoring currently achieved by other schemes, the geographic locations of sites included in six major surveys were determined and imported into Arcview/GIS in order to map their positions in relation to ESA and ESA agreement land. These surveys include the Common Bird Census (CBC), the Breeding Waders of Wet Meadow Survey (BWWM), the Waterways Bird Survey (WBS), the Waterways Breeding Bird Survey (WBBS) and the Wetland Bird Survey (WeBS) Core Counts and Low Tide Counts. Apart from the BWWM, which was carried out in 1982 with an update in 2002, all the above surveys were carried out annually, with observers making repeat visits to the same site. Because observers are asked to repeat surveying the same site, there is little change in survey sites on

ESA land, with 2002 BWWM data used as being representative of this survey. Unlike the BBS, which surveys allocated 1-km squares, the surveys above differ widely in the size and shape of sites involved. Unfortunately images showing the exact boundaries of each survey site were not available for these surveys, so surveys along linear waterways (WBS & WBBS), were represented by rectangles positioned in the direction surveyed and other surveys (CBC, BWWM, WeBS) represented by a point at their central location. This will result in some underestimation of ESA coverage, as some individual survey sites are very large, but are represented by a single point. For example, a large proportion of the Somerset Levels and Moors is surveyed each year through WeBs, yet is represented by a single point.

### 3. **RESULTS/DISCUSSION**

#### 3.1 Species occurrence and abundance in ESAs

The distribution of all BBS squares surveyed in England and Wales in 1999 in relation to ESA and ESA agreement land are shown in Figure 2. Of 1782 BBS squares surveyed in England in 1999, 193 (11%) coincided to some degree with land within English ESA boundaries. Of these, 129 (7%) of squares intersected ESA agreement land. The location of BBS squares in relation to ESA and ESA agreement land is shown in more detail by area in Figures 3 to 7. Of 28 ESAs in England and Wales, nine (six in England) contained ten or more BBS squares of which at least three in England contained ten or more BBS squares, which contained agreement land (Table 1).

A total of 145 bird species were recorded on BBS squares that intersected ESA land in England, of which 59 were recorded on 30 or more squares (Table 2). Of these, 12 species are listed as priority species in the UK Government's *Biodiversity Action Plan* (BAP – Anon 2001), which includes Skylark, Song Thrush, Linnet, Reed Bunting, Bullfinch, Spotted Flycatcher, Turtle Dove, Grey Partridge, Corn Bunting, Woodlark, Tree Sparrow and Stone Curlew. Twenty species recorded on ESA land were also listed as farmland indicators in the Government's *Quality of Life* (QOL) breeding bird indicator (Woodpigeon, Skylark, Jackdaw, Starling, Greenfinch, Rook, Goldfinch, Linnet, Whitethroat, Yellowhammer, Stock Dove, Kestrel, Lapwing, Reed Bunting, Turtle Dove, Yellow Wagtail, Grey Partridge, Corn Bunting, Tree Sparrow and Barn Owl). For interest, a comparison between population trends of two example species (Skylark and Lapwing) on ESA versus non-ESA land was made using BBS data for the period 1995 to 2000, figures for which are presented in Appendix 1. Standard indexing methods were used according to (ter Braak *et al.* 1994).

In Wales a total of 108 species were recorded on BBS that intersected ESA land, which included 19 species recorded on 30 or more squares (Table 3). Of these eight were BAP species (Song Thrush, Skylark, Linnet, Bullfinch, Spotted Flycatcher, Reed Bunting, Tree Sparrow and Grey Partridge) and 16 listed as QOL farmland indicators (Woodpigeon, Jackdaw, Skylark, Rook, Whitethroat, Greenfinch, Goldfinch, Linnet, Starling, Yellowhammer, Lapwing, Kestrel, Reed Bunting, Stock Dove, Tree Sparrow and Grey Partridge).

A total of 139 species were recorded in English squares that contained ESA agreement land, with 48 of these observed on 30 or more squares (Table 4). These include three BAP species (Skylark, Song Thrush and Linnet) and thirteen QOL – farmland indicator species (Woodpigeon, Skylark, Jackdaw, Starling, Greenfinch, Rook, Goldfinch, Whitethroat, Yellowhammer, Stock Dove, Kestrel and Lapwing), shown in Table 5. This table also shows the number of BBS transect sections and number of individual ESAs recording each BAP and QOC – farmland indicator species.

Nine ESAs were sufficiently covered by BBS that species could potentially occur on ten or more squares (see Table 1). A summary of the species recorded on ten or more BBS squares in individual ESAs is provided in Tables 6-14. Excluding data from 19 ESAs where there were less than ten BBS squares, the number of species that could be monitored in this relatively crude way varied from one (e.g. Dartmoor) to 32 (Brecklands or the Cotswolds).

### **3.2** Species occurrence and abundance at the transect level

In this section, data are restricted to those associated with transect sections within ESA land or ESA agreement land in England. Of 17,820 transect sections surveyed in England in 1999, 2011 (11%) intersected ESA land. Of those, 787 (4%) intersected ESA agreement land. In total, 142 species were recorded on BBS transect sections that intersected ESA land, and of these, 16 were recorded on 300 or more transect sections (Table 15). These included two BAP species, the Skylark and Song Thrush and three QOL – farmland indicator species (Woodpigeon, Skylark and Jackdaw). The number of BBS transect sections recording each BAP and QOL species on ESA land is shown in Table 4. On

ESA agreement land, of 128 species recorded, seven were recorded on 300 or more transect sections, which included the Woodpigeon, a QOL listed species (Table 16).

### 3.3 Extent of bird monitoring by the BTO on ESAs

The number of sites that wholly or partially intersect ESAs and English ESA agreement land in each of the following surveys organised by the BTO or its partners (CBC, BWWM, WBS, WBBS, WeBS) are shown in Table 16. The geographic locations of these in relation to ESA and ESA agreement land are shown in Figures 8 to 12. Of the 12 BAP species and 20 QOL – farmland indicator species recorded on ESA land in England, three BAP species and 11 QOL – farmland indicator species were recorded on ten or more BBS squares in one or more individual ESAs (Table 5).

### 4. CONCLUSIONS

- 1. The findings of this study suggest that it should be possible to produce annual indices of relative abundance as indexed nationally and by country by the BTO as part of the Breeding Bird Survey (Noble *et al.* 2001) for about 67 species occurring on BBS squares that intersect English and Welsh ESAs and about 48 species on BBS squares that intersect agreement land in England. If the number of BBS squares surveyed was increased, the number of species that could be monitored by such an approach would increase. A disadvantage of the whole square approach is that the analyses would include counts of birds on transects that extend outside ESA boundaries.
- 2. Although a small number of individual species and species groups of high conservation concern are currently monitored on ESA land (e.g. Stone Curlews in the Brecks and breeding waders in the Pennine Dales by the RSPB), there is little information available on changes in the abundance of widespread and abundant species. The findings from this study show that data collected as part of the BBS could be used to monitor about 13 widespread species of conservation concern in English and Wales ESA land through the production of annual indices of relative abundance at the BBS square level. This includes nine red-listed BAP species (Skylark, Song Thrush, Linnet, Reed Bunting, Bullfinch, Turtle Dove, Grey Partridge, Corn Bunting and Spotted Flycatcher) and ten amber-listed species (Curlew, Lapwing, Kestrel, Green Woodpecker, Swallow, Blackbird, Dunnock, Starling, Stock Dove and Goldfinch).
- 3. Summary information presented for individual ESAs suggests that the current level of coverage by the BBS is not adequate for monitoring the change in abundance of any species within individual ESAs. The largest number of squares surveyed for a species within an ESA was 23 for the Chaffinch on the Cotswold ESA, which is below the standard of thirty squares for routinely producing population indices in the Breeding Bird Survey annual reports (Noble *et al.* 2001).
- 4. The data on bird abundance collected specifically on 200 metre long BBS transect sections that intersect ESAs (or ESA agreement land) suggest that it may be possible to monitor a limited number of species at this level of resolution, which may be appropriate for examining the effects of habitat management under ESA agreement. However, as birds are likely be influenced by land management practices at a broader scale than the transect section alone, the loss of information associated with this approach may not be justified. If monitoring is to be carried out at the transect section level, formal analysis would first be required to establish the level of monitoring required at the transect section level to achieve a known level of precision and to allow for non-independence amongst transect sections.
- **5.** In principle, the pooling of information across five other organised surveys (CBC, BWWM, WBS, WBBS and WeBS) examined here could be used to try and better understand changes in species populations on ESA and ESA agreement land than is possible with the BBS alone.
- 6. This study highlights the potential of the BBS and other BTO surveys for assessing the value of other Government schemes, such as the Countryside Stewardship Scheme to birds.

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| ESA                       | No. of squares<br>in ESA | No. of squares in agreement land |
|---------------------------|--------------------------|----------------------------------|
|                           | 4                        | 4                                |
| Avon valley               | 1                        | 1                                |
| Blackdown Hills           | 6                        | 4                                |
| Breckland                 | 19                       | 9                                |
| Broads                    | 6                        | 4                                |
| Cambrian Mountains        | 12                       | -                                |
|                           | 4                        | 4                                |
| Clwydian Range            | 8                        | -                                |
| Cotswold Hills            | 23                       | 19                               |
| Dartmoor                  | 11                       | 6                                |
| Essex Coast               | 6                        | 3                                |
| Exmoor                    | 7                        | 7                                |
| Lake District             | 17                       | 16                               |
| Lleyn Peninsula           | 5                        | -                                |
| North Kent Marshes        | 8                        | 8                                |
| North Peak                | 13                       | 14                               |
| Pennine Dales             | 9                        | 8                                |
| Preseli                   | 11                       | -                                |
| Radnor                    | 6                        | -                                |
| Shropshire Hills          | 9                        | 9                                |
| Somerset Levels and Moors | 7                        | 7                                |
| South Downs               | 9                        | 6                                |
| South Wessex Downs        | 9                        | 6                                |
| South West Peak           | 7                        | 7                                |
| Suffolk River Valley      | 10                       | 7                                |
| Test Valley               | 4                        | 3                                |
| Upper Thames Tributaries  | 8                        | 7                                |
| West Penwith              | 0                        | -                                |
| Ynys Mon                  | 11                       | -                                |

**Table 1.**Number of BBS squares falling within English and Welsh ESAs and within English ESA<br/>agreement land in 1999.

**Table 2.** Occurrence and abundance of breeding birds in 1999 BBS squares that intersect ESA land in England. n is the number of occupied BBS squares, Proportion is the proportion of total BBS squares that intersect ESA land, Mean is the mean number of individuals counted per occupied BBS square with associated standard deviation, Std is the standard deviation, Max is the highest count on a BBS square and Total is the total number of individuals counted. A cut-off line (----) is shown in the table, below which it unlikely to be able to monitor these species' populations with an acceptable level of precision (based on requiring a mean of 30 or more occupied squares). BAP priority species and QOL – farmland bird indicators are highlighted in bold.

| Species                  | n   | Proportion | Mean | Std  | Max | Total |
|--------------------------|-----|------------|------|------|-----|-------|
| Chaffinch                | 176 | 91         | 11.4 | 6.7  | 31  | 2004  |
| Woodpigeon               | 171 | 89         | 23.6 | 31.7 | 287 | 4038  |
| Carrion Crow             | 171 | 89         | 10.6 | 11.8 | 84  | 1821  |
| Wren                     | 170 | 88         | 9.3  | 5.8  | 24  | 1582  |
| Blackbird                | 165 | 85         | 10.4 | 8.2  | 42  | 1721  |
| Blue Tit                 | 163 | 84         | 7.0  | 4.7  | 25  | 1137  |
| Robin                    | 162 | 84         | 6.3  | 4.8  | 26  | 1024  |
| Great Tit                | 150 | 78         | 4.6  | 3.5  | 21  | 697   |
| Pheasant                 | 148 | 77         | 5.6  | 6.0  | 37  | 826   |
| Swallow                  | 147 | 76         | 6.1  | 5.7  | 36  | 892   |
| Skylark                  | 144 | 75         | 8.6  | 9.8  | 63  | 1236  |
| Magpie                   | 133 | 69         | 3.5  | 2.9  | 18  | 469   |
| Dunnock                  | 131 | 68         | 3.5  | 2.8  | 16  | 457   |
| Song Thrush              | 127 | 66         | 3.2  | 2.5  | 19  | 410   |
| Jackdaw                  | 127 | 66         | 12.4 | 14.3 | 93  | 1573  |
| Willow Warbler           | 123 | 64         | 5.0  | 4.4  | 19  | 613   |
| Blackbird                | 120 | 62         | 2.9  | 2.2  | 10  | 347   |
| Starling                 | 119 | 62         | 20.6 | 36.7 | 276 | 2453  |
| Greenfinch               | 111 | 58         | 5.6  | 5.1  | 25  | 618   |
| Rook                     | 106 | 55         | 25.5 | 29.7 | 139 | 2706  |
| Goldfinch                | 106 | 55         | 3.8  | 3.1  | 20  | 401   |
| Pied Wagtail             | 105 | 54         | 2.4  | 1.7  | 10  | 248   |
| House Sparrow            | 102 | 53         | 9.8  | 10.7 | 56  | 1001  |
| Linnet                   | 95  | 49         | 6.0  | 7.6  | 43  | 566   |
| Mistle Thrush            | 93  | 48         | 2.7  | 2.2  | 12  | 250   |
| Chiffchaff               | 91  | 47         | 2.7  | 1.8  | 8   | 244   |
| Mallard                  | 89  | 46         | 6.2  | 6.3  | 30  | 548   |
| Whitethroat              | 89  | 46         | 2.9  | 2.8  | 20  | 258   |
| Yellowhammer             | 89  | 46         | 3.9  | 3.1  | 18  | 343   |
| Collared Dove            | 77  | 40         | 4.7  | 5.3  | 31  | 361   |
| Cuckoo                   | 77  | 40         | 1.7  | 1.1  | 7   | 129   |
| Meadow Pipit             | 73  | 38         | 15.7 | 16.7 | 80  | 1145  |
| Green Woodpecker         | 71  | 37         | 1.7  | 1.0  | 6   | 118   |
| Swift                    | 70  | 36         | 8.2  | 11.8 | 62  | 571   |
| Stock Dove               | 69  | 36         | 3.5  | 5.3  | 41  | 240   |
| Great Spotted Woodpecker | 66  | 34         | 1.5  | 0.9  | 5   | 97    |
| House Martin             | 65  | 34         | 9.6  | 12.3 | 81  | 622   |
| Buzzard                  | 64  | 33         | 1.8  | 0.9  | 4   | 117   |
| Curlew                   | 58  | 30         | 3.9  | 3.5  | 18  | 229   |
| Goldcrest                | 56  | 29         | 3.2  | 3.4  | 21  | 180   |
| Coal Tit                 | 55  | 28         | 3.9  | 3.6  | 13  | 213   |
| Jay                      | 55  | 28         | 1.4  | 0.7  | 4   | 79    |
| Moorhen                  | 53  | 27         | 2.5  | 1.9  | 11  | 130   |
| Long-tailed Tit          | 52  | 27         | 3.5  | 2.6  | 12  | 182   |

| Kestrel                  | 51 | 26 | 1.2        | 0.6  | 4  | 60  |
|--------------------------|----|----|------------|------|----|-----|
| Lapwing                  | 51 | 26 | 9.5        | 13.6 | 74 | 486 |
| Garden Warbler           | 51 | 26 | 1.8        | 1.2  | 5  | 92  |
| Grey Heron               | 50 | 26 | 2.6        | 3.6  | 17 | 131 |
| Red-legged Partridge     | 45 | 23 | 4.8        | 4.6  | 22 | 217 |
| Black-headed Gull        | 42 | 22 | 14.3       | 18.6 | 76 | 601 |
| Lesser Black-backed Gull | 42 | 22 | 10.7       | 20.7 | 90 | 448 |
| Reed Bunting             | 40 | 21 | 22         | 13   | 7  | 89  |
| Herring Gull             | 39 | 20 | 9.0        | 12.5 | 53 | 351 |
| Canada Goose             | 38 | 20 | 77         | 15.2 | 89 | 292 |
| Treecreeper              | 37 | 19 | 1.7        | 0.8  | 5  | 55  |
| Redstart                 | 34 | 18 | 2.9        | 1 0  | 7  | 100 |
| Nutbatch                 | 33 | 17 | 2.5        | 1.5  | 8  | 68  |
| Bullfinch                | 32 | 17 | 1 0        | 0.0  | 5  | 60  |
| Wheatear                 | 31 | 16 | 1.5        | 30   | 18 | 120 |
| Muto Swop                | 20 | 10 | 4.Z        | 0.9  | 10 | 129 |
| Coot                     | 29 | 15 | 5.5<br>4.2 | 0.5  | 40 | 100 |
| Spotted Elvestober       | 29 | 15 | 4.5        | 4.1  | 10 | 120 |
| Spolled FlyCalcher       | 29 | 10 | 1.5        | 0.9  | 4  | 40  |
|                          | 20 | 10 | 4.2        | 4.3  | 19 | 100 |
| Shelduck                 | 24 | 12 | 0.2        | 10.3 | 44 | 197 |
| Sparrownawk              | 24 | 12 | 1.3        | 0.5  | 3  | 30  |
|                          | 23 | 12 | 2.7        | 2.2  | 8  | 62  |
| Raven                    | 23 | 12 | 1.8        | 1.0  | 5  | 42  |
| I urtle Dove             | 22 | 11 | 2.7        | 2.7  | 12 | 60  |
|                          | 22 | 11 | 2.3        | 2.1  | 9  | 50  |
| Feral Pigeon             | 21 | 11 | 7.2        | 11./ | 41 | 152 |
| Grey Wagtail             | 21 | 11 | 1.6        | 0.9  | 4  | 33  |
| Marsh Lit                | 20 | 10 | 2.0        | 1.1  | 5  | 39  |
| Reed Warbler             | 19 | 10 | 6.9        | 7.2  | 28 | 131 |
| Redshank                 | 18 | 9  | 8.1        | 8.7  | 33 | 145 |
| Tufted Duck              | 17 | 9  | 4.6        | 5.9  | 26 | 79  |
| Oystercatcher            | 16 | 8  | 6.0        | 7.2  | 27 | 96  |
| Cormorant                | 15 | 8  | 2.4        | 2.0  | 7  | 36  |
| Lesser Whitethroat       | 15 | 8  | 1.7        | 1.0  | 4  | 25  |
| Grey Partridge           | 14 | 7  | 2.1        | 1.1  | 4  | 29  |
| Little Grebe             | 13 | 7  | 1.5        | 1.0  | 4  | 20  |
| Red Grouse               | 13 | 7  | 11.4       | 11.5 | 33 | 148 |
| Snipe                    | 13 | 7  | 2.8        | 2.0  | 7  | 36  |
| Greylag Goose            | 12 | 6  | 8.0        | 7.9  | 28 | 96  |
| Corn Bunting             | 12 | 6  | 3.2        | 2.9  | 11 | 38  |
| Tawny Owl                | 11 | 6  | 1.2        | 0.6  | 3  | 13  |
| Whinchat                 | 11 | 6  | 3.5        | 3.3  | 12 | 39  |
| Stonechat                | 11 | 6  | 2.0        | 1.5  | 6  | 22  |
| Dipper                   | 10 | 5  | 1.4        | 0.7  | 3  | 14  |
| Great Crested Grebe      | 9  | 5  | 2.3        | 1.4  | 5  | 21  |
| Woodlark                 | 9  | 5  | 1.6        | 1.0  | 4  | 14  |
| Siskin                   | 9  | 5  | 3.0        | 3.5  | 12 | 27  |
| Gadwall                  | 8  | 4  | 2.5        | 1.7  | 5  | 20  |
| Golden Plover            | 8  | 4  | 10.3       | 10.4 | 30 | 82  |
| Pied Flycatcher          | 8  | 4  | 2.5        | 2.3  | 8  | 20  |
| Willow Tit               | 8  | 4  | 2.1        | 1.2  | 4  | 17  |
| Common Gull              | 7  | 4  | 2.7        | 2.2  | 7  | 19  |
| Common Tern              | 7  | 4  | 2.4        | 1.6  | 5  | 17  |
| Sand Martin              | 7  | 4  | 3.9        | 3.3  | 10 | 27  |
| Nightingale              | 7  | 4  | 2.6        | 2.2  | 7  | 18  |
| Wood Warbler             | 7  | 4  | 1.6        | 0.8  | 3  | 11  |
| Pochard                  | 6  | 3  | 3.3        | 3.0  | 9  | 20  |
| Whimbrel                 | 6  | 3  | 6.0        | 4.8  | 14 | 36  |
| Ring Ouzel               | 6  | 3  | 2.2        | 1.5  | 5  | 13  |
| Shoveler                 | 5  | 3  | 2.6        | 1.1  | 4  | 13  |

| Great Black-backed Gull   | 5 | 3 | 2.6 | 2.1 | 6  | 13 |
|---------------------------|---|---|-----|-----|----|----|
| Little Tern               | 5 | 3 | 4.0 | 5.6 | 14 | 20 |
| Little Owl                | 5 | 3 | 1.4 | 0.5 | 2  | 7  |
| Lesser Spotted Woodpecker | 5 | 3 | 1.6 | 1.3 | 4  | 8  |
| Lesser Redpoll            | 5 | 3 | 3.2 | 1.3 | 5  | 16 |
| Goosander                 | 4 | 2 | 1.5 | 0.6 | 2  | 6  |
| Marsh Harrier             | 4 | 2 | 1.5 | 0.6 | 2  | 6  |
| Peregrine                 | 4 | 2 | 1.0 | 0.0 | 1  | 4  |
| Avocet                    | 4 | 2 | 4.8 | 3.4 | 9  | 19 |
| Stone Curlew              | 4 | 2 | 2.5 | 1.7 | 5  | 10 |
| Common Sandpiper          | 4 | 2 | 1.0 | 0.0 | 1  | 4  |
| Tree Sparrow              | 4 | 2 | 3.3 | 2.9 | 7  | 13 |
| Egyptian Goose            | 3 | 2 | 2.0 | 1.0 | 3  | 6  |
| Merlin                    | 3 | 2 | 1.3 | 0.6 | 2  | 4  |
| Ringed Plover             | 3 | 2 | 6.0 | 6.9 | 14 | 18 |
| Woodcock                  | 3 | 2 | 1.0 | 0.0 | 1  | 3  |
| Greenshank                | 3 | 2 | 1.3 | 0.6 | 2  | 4  |
| Short-eared Owl           | 3 | 2 | 2.3 | 1.2 | 3  | 7  |
| Kingfisher                | 3 | 2 | 1.0 | 0.0 | 1  | 3  |
| Cetti's Warbler           | 3 | 2 | 1.0 | 0.0 | 1  | 3  |
| Grasshopper Warbler       | 3 | 2 | 1.0 | 0.0 | 1  | 3  |
| Barnacle Goose            | 2 | 1 | 1.0 | 0.0 | 1  | 2  |
| Mandarin                  | 2 | 1 | 2.0 | 0.0 | 2  | 4  |
| Goshawk                   | 2 | 1 | 1.0 | 0.0 | 1  | 2  |
| Quail                     | 2 | 1 | 1.0 | 0.0 | 1  | 2  |
| Black-tailed Godwit       | 2 | 1 | 7.5 | 9.2 | 14 | 15 |
| Turnstone                 | 2 | 1 | 6.0 | 5.7 | 10 | 12 |
| Barn Owl                  | 2 | 1 | 1.0 | 0.0 | 1  | 2  |
| Fieldfare                 | 2 | 1 | 5.0 | 1.4 | 6  | 10 |
| Common Crossbill          | 2 | 1 | 1.0 | 0.0 | 1  | 2  |
| Shag                      | 1 | 1 | 1.0 |     | 1  | 1  |
| Brent Goose               | 1 | 1 | 1.0 |     | 1  | 1  |
| Teal                      | 1 | 1 | 7.0 |     | 7  | 7  |
| Hen harrier               | 1 | 1 | 1.0 |     | 1  | 1  |
| Grey Plover               | 1 | 1 | 3.0 |     | 3  | 3  |
| Dunlin                    | 1 | 1 | 4.0 |     | 4  | 4  |
| Spotted Redshank          | 1 | 1 | 3.0 |     | 3  | 3  |
| Green Sandpiper           | 1 | 1 | 1.0 |     | 1  | 1  |
| Mediterranean Gull        | 1 | 1 | 2.0 |     | 2  | 2  |
| Redwing                   | 1 | 1 | 2.0 |     | 2  | 2  |
| Twite                     | 1 | 1 | 1.0 |     | 1  | 1  |

**Table 3.** Occurrence and abundance of breeding birds in 1999 BBS squares that intersect ESA land in Wales. *n* is the number of occupied BBS squares, Proportion is the proportion of total BBS squares that intersect ESA land, Mean is the mean number of individuals counted per occupied BBS square with associated standard deviation, Std is the standard deviation, Max is the highest count on a BBS square and Total is the total number of individuals counted. A cut-off line (----) is shown in the table, below which it unlikely to be able to monitor these species' populations with an acceptable level of precision (based on requiring a mean of 30 or more occupied squares). BAP priority species and QOL – farmland bird indicators are highlighted in bold.

| Species                  | n  | Proportion | Mean | Std  | Max | Total |
|--------------------------|----|------------|------|------|-----|-------|
| Carrion Crow             | 52 | 98         | 13.5 | 11.1 | 49  | 702   |
| Wren                     | 51 | 96         | 9.9  | 7.2  | 33  | 505   |
| Robin                    | 50 | 94         | 6.7  | 5.0  | 26  | 334   |
| Chaffinch                | 50 | 94         | 10.7 | 7.0  | 28  | 536   |
| Swallow                  | 49 | 92         | 8.8  | 8.9  | 54  | 433   |
| Blackbird                | 49 | 92         | 8.4  | 5.4  | 23  | 414   |
| Blue Tit                 | 48 | 91         | 6.7  | 6.4  | 37  | 322   |
| Woodpigeon               | 47 | 89         | 7.4  | 6.9  | 28  | 346   |
| Dunnock                  | 47 | 89         | 3.6  | 2.8  | 14  | 171   |
| Willow Warbler           | 47 | 89         | 6.6  | 4.2  | 17  | 312   |
| Magpie                   | 45 | 85         | 6.1  | 4.5  | 27  | 275   |
| Great Tit                | 41 | 77         | 3.7  | 2.5  | 11  | 150   |
| Jackdaw                  | 41 | 77         | 13.2 | 13.6 | 59  | 542   |
| Song Thrush              | 39 | 74         | 3.0  | 2.3  | 9   | 116   |
| House Sparrow            | 37 | 70         | 10.6 | 11.0 | 54  | 391   |
| Skylark                  | 34 | 64         | 4.9  | 4.8  | 20  | 166   |
| Buzzard                  | 33 | 62         | 2.3  | 2.2  | 10  | 76    |
| Pied Wagtail             | 31 | 58         | 2.2  | 1.7  | 7   | 69    |
| Rook                     | 31 | 58         | 23.9 | 49.7 | 267 | 740   |
| Pheasant                 | 29 | 55         | 2.3  | 2.0  | 10  | 67    |
| House Martin             | 29 | 55         | 4.5  | 4.4  | 19  | 130   |
| Whitethroat              | 29 | 55         | 3.6  | 4.0  | 22  | 104   |
| Blackcap                 | 29 | 55         | 2.7  | 2.2  | 10  | 79    |
| Greenfinch               | 29 | 55         | 3.9  | 3.8  | 15  | 113   |
| Goldfinch                | 29 | 55         | 4.9  | 4.0  | 16  | 143   |
| Meadow Pipit             | 28 | 53         | 10.0 | 14.9 | 73  | 280   |
| Linnet                   | 28 | 53         | 9.1  | 11.4 | 49  | 255   |
| Herring Gull             | 27 | 51         | 16.6 | 23.2 | 94  | 449   |
| Mistle Thrush            | 26 | 49         | 2.7  | 2.0  | 7   | 69    |
| Collared Dove            | 23 | 43         | 3.1  | 2.0  | 8   | 71    |
| Chiffchaff               | 23 | 43         | 3.5  | 2.4  | 10  | 80    |
| Lesser Black-backed Gull | 21 | 40         | 18.6 | 43.3 | 186 | 391   |
| Goldcrest                | 21 | 40         | 3.5  | 5.1  | 24  | 73    |
| Starling                 | 21 | 40         | 10.2 | 16.7 | 68  | 214   |
| Mallard                  | 20 | 38         | 2.8  | 1.7  | 6   | 56    |
| Wheatear                 | 20 | 38         | 3.0  | 1.9  | 7   | 60    |
| Cuckoo                   | 19 | 36         | 1.2  | 0.4  | 2   | 23    |
| Raven                    | 19 | 36         | 2.4  | 1.6  | 7   | 46    |
| Yellowhammer             | 18 | 34         | 2.6  | 2.3  | 9   | 46    |
| Curlew                   | 16 | 30         | 6.4  | 13.4 | 56  | 103   |
| Great Spotted Woodpecker | 15 | 28         | 1.1  | 0.3  | 2   | 16    |
| Stonechat                | 15 | 28         | 2.5  | 1.5  | 5   | 38    |
| Swift                    | 14 | 26         | 4.1  | 4.5  | 16  | 57    |
| Redstart                 | 14 | 26         | 3.9  | 3.1  | 12  | 55    |

| Coal Tit                  | 14 | 26 | 1.8  | 1.4  | 5  | 25  |
|---------------------------|----|----|------|------|----|-----|
| Feral Pigeon              | 13 | 25 | 9.2  | 7.7  | 22 | 120 |
| Garden Warbler            | 13 | 25 | 1.5  | 0.7  | 3  | 20  |
| Long-tailed Tit           | 13 | 25 | 2.9  | 2.2  | 7  | 38  |
| Tree Pipit                | 12 | 23 | 2.0  | 1.4  | 5  | 24  |
| Pied Flycatcher           | 12 | 23 | 2.5  | 1.9  | 6  | 30  |
| Bullfinch                 | 12 | 23 | 1.3  | 0.7  | 3  | 16  |
| Sedge Warbler             | 11 | 21 | 2.9  | 2.9  | 11 | 32  |
| Nuthatch                  | 11 | 21 | 2.0  | 1.8  | 7  | 22  |
| Treecreeper               | 11 | 21 | 1.6  | 0.9  | 4  | 18  |
| Moorhen                   | 10 | 19 | 2.1  | 1.3  | 5  | 21  |
| Black-headed Gull         | 10 | 19 | 4.2  | 6.6  | 22 | 42  |
| Grey Heron                | 9  | 17 | 1.4  | 0.9  | 3  | 13  |
| Grey Wagtail              | 9  | 17 | 1.4  | 0.7  | 3  | 13  |
| Spotted Flycatcher        | 9  | 17 | 1.6  | 0.9  | 3  | 14  |
| Lapwing                   | 8  | 15 | 8.5  | 8.4  | 27 | 68  |
| Jay                       | 8  | 15 | 1.4  | 0.7  | 3  | 11  |
| Kestrel                   | 7  | 13 | 1.1  | 0.4  | 2  | 8   |
| Great Black-backed Gull   | 7  | 13 | 1.7  | 1.0  | 3  | 12  |
| Whinchat                  | 7  | 13 | 3.9  | 4.8  | 14 | 27  |
| Siskin                    | 7  | 13 | 2.1  | 1.1  | 4  | 15  |
| Lesser Redpoll            | 7  | 13 | 2.9  | 1.8  | 6  | 20  |
| Reed Bunting              | 7  | 13 | 2.3  | 1.8  | 6  | 16  |
| Sparrowhawk               | 6  | 11 | 1.0  | 0.0  | 1  | 6   |
| Grasshopper Warbler       | 6  | 11 | 1.3  | 0.5  | 2  | 8   |
| Cormorant                 | 5  | 9  | 2.4  | 1.7  | 5  | 12  |
| Red Kite                  | 5  | 9  | 1.4  | 0.5  | 2  | 7   |
| Oystercatcher             | 5  | 9  | 3.6  | 0.5  | 4  | 18  |
| Wood Warbler              | 5  | 9  | 2.8  | 1.6  | 4  | 14  |
| Greylag Goose             | 4  | 8  | 4.0  | 2.4  | 7  | 16  |
| Shelduck                  | 4  | 8  | 11.8 | 10.1 | 25 | 47  |
| Stock Dove                | 4  | 8  | 1.3  | 0.5  | 2  | 5   |
| Rock Dove                 | 4  | 8  | 2.0  | 0.0  | 2  | 8   |
| Lesser Whitethroat        | 4  | 8  | 2.3  | 1.9  | 5  | 9   |
| Willow Tit                | 4  | 8  | 1.8  | 1.0  | 3  | 7   |
| Fulmar                    | 3  | 6  | 3.0  | 2.6  | 6  | 9   |
| Canada Goose              | 3  | 6  | 1.7  | 0.6  | 2  | 5   |
| Little Owl                | 3  | 6  | 1.3  | 0.6  | 2  | 4   |
| Sand Martin               | 3  | 6  | 1.0  | 0.0  | 1  | 3   |
| Shag                      | 2  | 4  | 1.5  | 0.7  | 2  | 3   |
| Mute Swan                 | 2  | 4  | 2.0  | 0.0  | 2  | 4   |
| Coot                      | 2  | 4  | 1.0  | 0.0  | 1  | 2   |
| Snipe                     | 2  | 4  | 1.0  | 0.0  | 1  | 2   |
| Whimbrel                  | 2  | 4  | 15.0 | 19.8 | 29 | 30  |
| Lesser Spotted Woodpecker | 2  | 4  | 1.0  | 0.0  | 1  | 2   |
| Tree Sparrow              | 2  | 4  | 5.0  | 4.2  | 8  | 10  |
| Little Grebe              | 1  | 2  | 3.0  | •    | 3  | 3   |
| Gannet                    | 1  | 2  | 3.0  | •    | 3  | 3   |
| Gadwall                   | 1  | 2  | 1.0  | •    | 1  | 1   |
| Peregrine                 | 1  | 2  | 1.0  | •    | 1  | 1   |
| Red Grouse                | 1  | 2  | 1.0  | •    | 1  | 1   |
| Red-legged Partridge      | 1  | 2  | 1.0  | •    | 1  | 1   |
| Grey Partridge            | 1  | 2  | 2.0  | •    | 2  | 2   |
| Ringed Plover             | 1  | 2  | 1.0  | •    | 1  | 1   |
| Golden Plover             | 1  | 2  | 4.0  | •    | 4  | 4   |
| Redshank                  | 1  | 2  | 3.0  | •    | 3  | 3   |
| Greenshank                | 1  | 2  | 1.0  | •    | 1  | 1   |
| Sandwich Lern             | 1  | 2  | 1.0  | •    | 1  | 1   |
| Razorbill                 | 1  | 2  | 1.0  | •    | 1  | 1   |
| Black Guillemot           | 1  | 2  | 5.0  | •    | 5  | 5   |

| Tawny Owl        | 1 | 2 | 1.0 | 1 | 1 |
|------------------|---|---|-----|---|---|
| Nightjar         | 1 | 2 | 1.0 | 1 | 1 |
| Green Woodpecker | 1 | 2 | 1.0 | 1 | 1 |
| Chough           | 1 | 2 | 4.0 | 4 | 4 |

**Table 4.** Occurrence and abundance of breeding birds in 1999 BBS squares that intersect ESA agreement land in England. n is the number of occupied BBS squares, proportion is the proportion of total BBS squares that intersect ESA agreement land, mean is the mean number of individuals counted per occupied BBS square with associated standard deviation, max is the highest count on a BBS square and total is the total number of individuals counted. A cut-off line (----) is shown in the table, below which it unlikely to be able to monitor these species populations with an acceptable level of precision (based on requiring a mean of 30 or more occupied squares). BAP priority species and QOL – farmland bird indicators are highlighted in bold.

| Species                  | n   | Proportion | Mean | Std  | Max | Total |
|--------------------------|-----|------------|------|------|-----|-------|
| Chaffinch                | 120 | 93         | 10.9 | 6.9  | 31  | 1305  |
| Wren                     | 116 | 90         | 8.7  | 5.7  | 24  | 1011  |
| Woodpigeon               | 114 | 88         | 18.0 | 29.7 | 287 | 2048  |
| Carrion Crow             | 114 | 88         | 11.6 | 11.7 | 84  | 1326  |
| Robin                    | 111 | 86         | 6.0  | 5.1  | 26  | 671   |
| Blackbird                | 111 | 86         | 9.8  | 7.6  | 42  | 1086  |
| Blue tit                 | 108 | 84         | 7.3  | 5.0  | 25  | 783   |
| Swallow                  | 103 | 80         | 6.0  | 5.6  | 36  | 621   |
| Pheasant                 | 96  | 74         | 4.3  | 4.0  | 24  | 416   |
| Great Tit                | 96  | 74         | 4.5  | 3.2  | 18  | 430   |
| Magpie                   | 93  | 72         | 3.6  | 3.0  | 18  | 338   |
| Skylark                  | 90  | 70         | 7.7  | 7.0  | 38  | 697   |
| Willow Warbler           | 89  | 69         | 5.2  | 4.6  | 19  | 467   |
| Dunnock                  | 85  | 66         | 3.5  | 2.8  | 16  | 294   |
| Song Thrush              | 84  | 65         | 3.3  | 2.8  | 19  | 274   |
| Jackdaw                  | 83  | 64         | 11.6 | 15.1 | 93  | 959   |
| Blackcap                 | 77  | 60         | 2.9  | 2.2  | 10  | 221   |
| Starling                 | 77  | 60         | 20.9 | 39.5 | 276 | 1610  |
| Rook                     | 71  | 55         | 25.9 | 30.9 | 139 | 1840  |
| Greenfinch               | 71  | 55         | 5.2  | 4.8  | 22  | 368   |
| Goldfinch                | 71  | 55         | 3.6  | 2.5  | 10  | 254   |
| Pied Wagtail             | 69  | 53         | 2.3  | 1.9  | 10  | 161   |
| House Sparrow            | 65  | 50         | 8.5  | 9.3  | 42  | 550   |
| Linnet                   | 63  | 49         | 5.8  | 7.6  | 43  | 364   |
| Chiffchaff               | 61  | 47         | 2.6  | 1.8  | 7   | 161   |
| Yellowhammer             | 60  | 47         | 4.1  | 3.5  | 18  | 246   |
| Whitethroat              | 59  | 46         | 3.0  | 3.2  | 20  | 175   |
| Mistle Thrush            | 57  | 44         | 2.5  | 2.1  | 12  | 144   |
| Mallard                  | 55  | 43         | 6.7  | 6.9  | 30  | 370   |
| Meadow Pipit             | 54  | 42         | 16.2 | 16.3 | 80  | 876   |
| Cuckoo                   | 48  | 37         | 1.6  | 1.1  | 7   | 75    |
| Buzzard                  | 46  | 36         | 1.8  | 0.9  | 4   | 81    |
| Collared Dove            | 45  | 35         | 3.8  | 3.7  | 17  | 169   |
| Great Spotted Woodpecker | 44  | 34         | 1.5  | 0.8  | 5   | 64    |
| Curlew                   | 43  | 33         | 4.0  | 3.8  | 18  | 1/4   |
| Green Woodpecker         | 42  | 33         | 1.5  | 1.0  | 6   | 63    |
| House Martin             | 41  | 32         | 8.6  | 13.4 | 81  | 352   |
| Stock Dove               | 39  | 30         | 4.2  | 6.8  | 41  | 164   |
| Swift                    | 38  | 29         | 6.7  | 12.4 | 62  | 255   |
| Grey Heron               | 35  | 27         | 2.5  | 3.4  | 15  | 88    |
|                          | 35  | 21         | ∠.8  | 2.1  | 11  | 98    |
| Garden warbier           | 35  | 27         | 1.8  | 1.3  | 5   | 64    |
|                          | 34  | 26         | 1.2  | 0.6  | 4   | 41    |
| Coal IIt                 | 34  | 26         | 3.8  | 3.4  | 13  | 130   |

| Lapwing                  | 32 | 25 | 11.8 | 16.5       | 74     | 379     |
|--------------------------|----|----|------|------------|--------|---------|
| Long-tailed Tit          | 32 | 25 | 3.8  | 2.8        | 12     | 121     |
| Lesser Black-backed Gull | 30 | 23 | 12.9 | 24.1       | 90     | 387     |
| Goldcrest                | 30 | 23 | 2.9  | 2.2        | 9      | 87      |
| Black-headed Gull        | 29 | 22 | 15.2 | 20         | 76     | 441     |
| Jav                      | 29 | 22 | 1.4  | 0.7        | 4      | 42      |
| Redstart                 | 28 | 22 | 3.1  | 1.7        | 7      | 87      |
| Reed Bunting             | 27 | 21 | 2.1  | 1.1        | 4      | 58      |
| Treecreeper              | 26 | 20 | 1.6  | 0.9        | 5      | 41      |
| Herring Gull             | 25 | 19 | 10.9 | 14.1       | 53     | 272     |
| Wheatear                 | 25 | 19 | 4.1  | 4.2        | 18     | 102     |
| Canada Goose             | 24 | 19 | 8.3  | 17.9       | 89     | 200     |
| Red-legged Partridge     | 22 | 17 | 2.8  | 2.1        | 9      | 61      |
| Mute Swan                | 20 | 16 | 6.9  | 9.6        | 43     | 137     |
| Coot                     | 20 | 16 | 5.1  | 4.5        | 18     | 102     |
| Bullfinch                | 20 | 16 | 2.1  | 1.1        | 5      | 41      |
| Tree Pipit               | 17 | 13 | 2.9  | 2.4        | 8      | 49      |
| Spotted Flycatcher       | 17 | 13 | 1.5  | 1.0        | 4      | 26      |
| Nuthatch                 | 17 | 13 | 1.9  | 1.1        | 4      | 33      |
| Grey Wagtail             | 16 | 12 | 1.6  | 1.0        | 4      | 25      |
| Sedge Warbler            | 16 | 12 | 5.2  | 5.1        | 19     | 83      |
| Raven                    | 16 | 12 | 1.8  | 1.0        | 5      | 29      |
| Shelduck                 | 15 | 12 | 8.2  | 8.3        | 25     | 123     |
| Sparrowhawk              | 14 | 11 | 1.4  | 0.6        | 3      | 19      |
| Redshank                 | 14 | 11 | 7.8  | 9.3        | 33     | 109     |
| Reed Warbler             | 14 | 11 | 7.9  | 8.1        | 28     | 110     |
| Red Grouse               | 12 | 9  | 12.3 | 11.5       | 33     | 147     |
| Grey Partridge           | 12 | 9  | 2.1  | 1.2        | 4      | 25      |
| Oystercatcher            | 12 | 9  | 5.2  | 7.5        | 27     | 62      |
| Marsh Tit                | 12 | 9  | 2.1  | 1.3        | 5      | 25      |
| Cormorant                | 11 | 9  | 2.6  | 2.2        | 7      | 29      |
| Tufted Duck              | 11 | 9  | 5.3  | 7.3        | 26     | 58      |
| Snipe                    | 11 | 9  | 3.1  | 2.1        | 7      | 34      |
| Feral Pigeon             | 11 | 9  | 9.6  | 15.6       | 41     | 106     |
| Turtle Dove              | 11 | 9  | 3.5  | 3.3        | 12     | 39      |
| Yellow Wagtail           | 11 | 9  | 2.2  | 1.7        | 5      | 24      |
| Lesser Whitethroat       | 10 | 8  | 1.8  | 1.2        | 4      | 18      |
| Little Grebe             | 9  | 7  | 1.3  | 0.7        | 3      | 12      |
| Dipper                   | 9  | 7  | 1.4  | 0.7        | 3      | 13      |
| vvninchat                | 9  | /  | 3.9  | 3.6        | 12     | 35      |
| Golden Plover            | 8  | 6  | 10.3 | 10.4       | 30     | 82      |
| Pled Flycatcher          | 8  | 6  | 2.5  | 2.3        | 8      | 20      |
|                          | 7  | 5  | 1.7  | 0.8        | 3      | 12      |
| Stonochat                | 7  | 5  | 1.3  | 0.0<br>1 Q | 3<br>6 | 9<br>15 |
| Corn Bunting             | 7  | 5  | 2.1  | 1.0        | 4      | 10      |
| Greylag Goose            | 6  | 5  | 2.0  | 10.2       | 28     | 14      |
| Gadwall                  | 6  | 5  | 3.0  | 17         | 5      | 18      |
| Common Gull              | 6  | 5  | 3.0  | 2.3        | 7      | 18      |
| Ring Ouzel               | 6  | 5  | 22   | 1.5        | 5      | 13      |
| Wood Warbler             | 6  | 5  | 1.3  | 0.5        | 2      | 8       |
| Willow Tit               | 6  | 5  | 1.7  | 1.0        | 3      | 10      |
| Siskin                   | 6  | 5  | 3.8  | 4.2        | 12     | 23      |
| Pochard                  | 5  | 4  | 3.8  | 3.1        | 9      | 19      |
| Great Black backed Gull  | 5  | 4  | 2.6  | 2.1        | 6      | 13      |
| Common Tern              | 5  | 4  | 2.2  | 1.8        | 5      | 11      |
| Sand Martin              | 5  | 4  | 4.8  | 3.6        | 10     | 24      |
| Shoveler                 | 4  | 3  | 2.5  | 1.3        | 4      | 10      |
| Goosander                | 4  | 3  | 1.5  | 0.6        | 2      | 6       |
| Peregrine                | 4  | 3  | 1.0  | 0          | 1      | 4       |

| Whimbrel                  | 4 | 3 | 5.3 | 2.8 | 8 | 21 |
|---------------------------|---|---|-----|-----|---|----|
| Tree Sparrow              | 4 | 3 | 3.3 | 2.9 | 7 | 13 |
| Lesser Redpoll            | 4 | 3 | 3.0 | 1.4 | 5 | 12 |
| Egyptian Goose            | 3 | 2 | 2.0 | 1.0 | 3 | 6  |
| Marsh Harrier             | 3 | 2 | 1.7 | 0.6 | 2 | 5  |
| Merlin                    | 3 | 2 | 1.3 | 0.6 | 2 | 4  |
| Greenshank                | 3 | 2 | 1.3 | 0.6 | 2 | 4  |
| Common Sandpiper          | 3 | 2 | 1.0 | 0   | 1 | 3  |
| Lesser Spotted Woodpecker | 3 | 2 | 2.0 | 1.7 | 4 | 6  |
| Nightingale               | 3 | 2 | 3.7 | 2.9 | 7 | 11 |
| Avocet                    | 2 | 2 | 4.0 | 2.8 | 6 | 8  |
| Little Tern               | 2 | 2 | 1.5 | 0.7 | 2 | 3  |
| Barn Owl                  | 2 | 2 | 1.0 | 0   | 1 | 2  |
| Little Owl                | 2 | 2 | 1.5 | 0.7 | 2 | 3  |
| Kingfisher                | 2 | 2 | 1.0 | 0   | 1 | 2  |
| Woodlark                  | 2 | 2 | 1.5 | 0.7 | 2 | 3  |
| Fieldfare                 | 2 | 2 | 5.0 | 1.4 | 6 | 10 |
| Cetti's Warbler           | 2 | 2 | 1.0 | 0   | 1 | 2  |
| Shag                      | 1 | 1 | 1.0 |     | 1 | 1  |
| Feral Goose               | 1 | 1 | 1.0 |     | 1 | 1  |
| Teal                      | 1 | 1 | 7.0 |     | 7 | 7  |
| Hen Harrier               | 1 | 1 | 1.0 |     | 1 | 1  |
| Goshawk                   | 1 | 1 | 1.0 |     | 1 | 1  |
| Quail                     | 1 | 1 | 1.0 |     | 1 | 1  |
| Stone Curlew              | 1 | 1 | 1.0 |     | 1 | 1  |
| Dunlin                    | 1 | 1 | 4.0 |     | 4 | 4  |
| Woodcock                  | 1 | 1 | 1.0 |     | 1 | 1  |
| Black-tailed Godwit       | 1 | 1 | 1.0 | -   | 1 | 1  |
| Spotted Redshank          | 1 | 1 | 3.0 | -   | 3 | 3  |
| Green Sandpiper           | 1 | 1 | 1.0 |     | 1 | 1  |
| Turnstone                 | 1 | 1 | 2.0 |     | 2 | 2  |
| Short-eared Owl           | 1 | 1 | 3.0 | -   | 3 | 3  |
| Redwing                   | 1 | 1 | 2.0 |     | 2 | 2  |
| Grasshopper Warbler       | 1 | 1 | 1.0 |     | 1 | 1  |
| Twite                     | 1 | 1 | 1.0 |     | 1 | 1  |

**Table 5.** Occurrence of Biodiversity Action Plan (BAP) and 'Quality of Life' (QOL) – farmland bird species in ESAs in England. For each recorded BAP and QOL species, this shows the number of BBS squares that coincide with i) ESA land ii) ESA agreement land iii) the number of BBS transect sections that coincide with ESA land, and iv) the number of individual ESAs recording BAP/QOL species on ten or more BBS squares.

| Species            | BAP<br>species | QOL<br>species | BBS squares<br>in ESAs | BBS squares on agreement land | BBS transect<br>sections<br>on ESA land | ESAs recording<br>species on 10 or<br>more BBS squares |
|--------------------|----------------|----------------|------------------------|-------------------------------|-----------------------------------------|--------------------------------------------------------|
|                    |                |                |                        |                               |                                         | _                                                      |
| Woodpigeon         |                | •              | 171                    | 114                           | 850                                     | 5                                                      |
| Skylark            | •              | •              | 144                    | 90                            | 548                                     | 3                                                      |
| Song Thrush        | •              |                | 127                    | 84                            | 306                                     | 3                                                      |
| Jackdaw            |                | •              | 127                    | 83                            | 315                                     | 5                                                      |
| Starling           |                | •              | 119                    | 77                            | 282                                     | 2                                                      |
| Greenfinch         |                | •              | 111                    | 71                            | 259                                     | 3                                                      |
| Rook               |                | •              | 106                    | 71                            | 259                                     | 2                                                      |
| Goldfinch          |                | •              | 106                    | 71                            | 188                                     | 3                                                      |
| Linnet             | •              | •              | 95                     | 63                            | 192                                     | 3                                                      |
| Whitethroat        |                | •              | 89                     | 59                            | 161                                     | 3                                                      |
| Yellowhammer       |                | •              | 89                     | 60                            | 244                                     | 2                                                      |
| Stock Dove         |                | •              | 69                     | 39                            | 105                                     | 1                                                      |
| Kestrel            |                | ٠              | 51                     | 34                            | 46                                      | -                                                      |
| Lapwing            |                | ٠              | 51                     | 32                            | 97                                      | -                                                      |
| Reed Bunting       | ٠              | •              | 40                     | 27                            | 76                                      | -                                                      |
| Bullfinch          | •              |                | 32                     | 20                            | 37                                      | -                                                      |
| Spotted Flycatcher | ٠              |                | 29                     | 17                            | 26                                      | -                                                      |
| Turtle Dove        | •              | •              | 22                     | 11                            | 36                                      | -                                                      |
| Yellow Wagtail     |                | •              | 22                     | 11                            | 31                                      | -                                                      |
| Grey Partridge     | •              | •              | 14                     | 12                            | 17                                      | -                                                      |
| Corn Bunting       | •              | •              | 12                     | 7                             | 25                                      | -                                                      |
| Woodlark           | ٠              |                | 9                      | 2                             | 16                                      | -                                                      |
| Tree Sparrow       | •              | •              | 4                      | 4                             | 7                                       | -                                                      |
| Stone Curlew       | ٠              |                | 4                      | 1                             | 8                                       | -                                                      |
| Barn Owl           |                | •              | 2                      | 2                             | 1                                       | -                                                      |

**Table 6.** Occurrence and abundance of breeding birds occurring on ten or more BBS squares within the Lake District ESA of a possible 17 BBS squares that intersect ESA land. (Total number of species recorded - 79). BAP priority species and QOL – farmland bird indicators are highlighted in bold.

| Species        | n  | Proportion | Mean | Std  | Max | Total |
|----------------|----|------------|------|------|-----|-------|
| Buzzard        | 10 | 59         | 2.1  | 0.6  | 3   | 21    |
| Pheasant       | 10 | 59         | 3.5  | 2.1  | 7   | 35    |
| Meadow Pipit   | 11 | 65         | 19.4 | 19.3 | 74  | 213   |
| Song Thrush    | 11 | 65         | 4.0  | 2.9  | 11  | 44    |
| Jackdaw        | 11 | 65         | 12.1 | 16.7 | 60  | 133   |
| Blackbird      | 12 | 71         | 7.2  | 6.4  | 24  | 86    |
| Woodpigeon     | 13 | 76         | 3.9  | 2.7  | 9   | 51    |
| Blue Tit       | 13 | 76         | 7.3  | 6.0  | 19  | 95    |
| Magpie         | 13 | 76         | 2.2  | 1.4  | 6   | 29    |
| Robin          | 14 | 82         | 5.6  | 4.9  | 17  | 78    |
| Great Tit      | 14 | 82         | 4.4  | 4.5  | 15  | 62    |
| Swallow        | 15 | 88         | 7.7  | 8.4  | 28  | 115   |
| Willow Warbler | 15 | 88         | 7.3  | 5.6  | 17  | 109   |
| Carrion Crow   | 15 | 88         | 12.3 | 10.8 | 42  | 185   |
| Pied Wagtail   | 16 | 94         | 3.3  | 2.4  | 10  | 53    |
| Wren           | 16 | 94         | 7.1  | 4.2  | 15  | 113   |
| Chaffinch      | 17 | 100        | 12.6 | 6.7  | 27  | 215   |

**Table 7.** Occurrence and abundance of breeding birds occurring on ten or more BBS squares within the Cambrian Hills ESA of a possible 12 BBS squares that intersect ESA land. (Total number of species recorded - 65). BAP priority species and QOL- farmland bird indicators are highlighted in bold.

| Species        | n  | Proportion | Mean | Std  | Max | Total |
|----------------|----|------------|------|------|-----|-------|
| Wren           | 10 | 83         | 7.8  | 4.7  | 17  | 78    |
| Blue Tit       | 10 | 83         | 7.2  | 6.3  | 22  | 72    |
| Great Tit      | 10 | 83         | 3.5  | 3.7  | 11  | 35    |
| Buzzard        | 11 | 92         | 2.6  | 2.6  | 9   | 29    |
| Woodpigeon     | 11 | 92         | 2.0  | 0.9  | 4   | 22    |
| Meadow Pipit   | 11 | 92         | 17.4 | 20.2 | 73  | 191   |
| Robin          | 12 | 100        | 5.3  | 3.8  | 15  | 64    |
| Willow Warbler | 12 | 100        | 8.5  | 4.0  | 17  | 102   |
| Carrion Crow   | 12 | 100        | 13.7 | 13.3 | 49  | 164   |
| Chaffinch      | 12 | 100        | 12.2 | 7.9  | 28  | 146   |

**Table 8.** Occurrence and abundance of breeding birds occurring on ten or more BBS squares within the Dartmoor ESA of a possible 11 BBS squares that intersect ESA land. (Total number of species recorded - 65). BAP priority species and QOL – farmland bird indicators are highlighted in bold.

| Species      | n  | Proportion | Mean | Std  | Max | Total |
|--------------|----|------------|------|------|-----|-------|
| Carrion Crow | 10 | 91         | 13.3 | 17.2 | 60  | 133   |

**Table 9.** Occurrence and abundance of breeding birds occurring on ten or more BBS squares within the Suffolk Rivers ESA of a possible ten BBS squares that intersect ESA land. (Total number of species recorded - 89). BAP priority species and QOL – farmland bird indicators are highlighted in bold.

| Species           | n  | Proportion | Mean | Std  | Max | Total |
|-------------------|----|------------|------|------|-----|-------|
| <b>Woodpigeon</b> | 10 | 100        | 38.9 | 35.5 | 116 | 389   |
| Chaffinch         | 10 | 100        | 8.4  | 5.4  | 16  | 84    |

**Table 10.** Occurrence and abundance of breeding birds occurring on ten or more BBS squares within the Cotswold ESA of a possible 23 BBS squares that intersect ESA land. (Total number of species recorded - 83). BAP priority species and QOL – farmland bird indicators are highlighted in bold.

| Species                  | n  | Proportion | Mean | Std  | Max | Total |
|--------------------------|----|------------|------|------|-----|-------|
| Buzzard                  | 10 | 43         | 1.6  | 0.8  | 3   | 16    |
| Pied Wagtail             | 10 | 43         | 2.5  | 1.9  | 6   | 25    |
| Swift                    | 11 | 48         | 4.0  | 3.4  | 11  | 44    |
| Whitethroat              | 11 | 48         | 2.0  | 1.0  | 4   | 22    |
| Linnet                   | 11 | 48         | 5.2  | 3.9  | 12  | 57    |
| Mistle Thrush            | 12 | 52         | 2.7  | 2.7  | 10  | 32    |
| Goldfinch                | 12 | 52         | 3.8  | 2.9  | 10  | 45    |
| Collared Dove            | 13 | 57         | 2.7  | 2.1  | 8   | 35    |
| Great Spotted Woodpecker | 13 | 57         | 1.4  | 0.5  | 2   | 18    |
| House Sparrow            | 13 | 57         | 8.2  | 1.0  | 36  | 106   |
| Starling                 | 14 | 61         | 19.3 | 29.7 | 112 | 270   |
| Willow Warbler           | 15 | 65         | 2.5  | 1.9  | 7   | 38    |
| Rook                     | 16 | 70         | 22.6 | 37.0 | 139 | 362   |
| Chiffchaff               | 17 | 74         | 2.8  | 1.6  | 7   | 48    |
| Skylark                  | 18 | 78         | 9.7  | 7.1  | 25  | 174   |
| Dunnock                  | 18 | 78         | 3.5  | 1.8  | 7   | 63    |
| Magpie                   | 18 | 78         | 3.7  | 3.3  | 12  | 67    |
| Jackdaw                  | 18 | 78         | 16.7 | 16.8 | 61  | 301   |
| Yellowhammer             | 18 | 78         | 4.9  | 3.0  | 12  | 88    |
| Blackcap                 | 19 | 83         | 3.4  | 2.2  | 9   | 64    |
| Greenfinch               | 19 | 83         | 5.7  | 5.1  | 22  | 108   |
| Pheasant                 | 20 | 87         | 5.2  | 4.7  | 19  | 104   |
| Swallow                  | 20 | 87         | 5.7  | 3.8  | 12  | 113   |
| Song Thrush              | 20 | 87         | 3.8  | 2.3  | 9   | 76    |
| Great Tit                | 20 | 87         | 4.8  | 2.9  | 10  | 95    |
| Carrion Crow             | 21 | 91         | 11.1 | 8.5  | 35  | 233   |
| Blue Tit                 | 22 | 96         | 7.3  | 4.2  | 16  | 160   |
| Woodpigeon               | 23 | 100        | 22.4 | 14.7 | 65  | 515   |
| Wren                     | 23 | 100        | 9.4  | 5.3  | 23  | 216   |
| Robin                    | 23 | 100        | 6.6  | 4.6  | 17  | 151   |
| Blackbird                | 23 | 100        | 10.9 | 6.0  | 23  | 250   |
| Chaffinch                | 23 | 100        | 11.3 | 5.8  | 22  | 261   |

**Table 11.** Occurrence and abundance of breeding birds occurring on ten or more BBS squares within the Preseli ESA of a possible 11 BBS squares that intersect ESA land. (Total number of species recorded - 78). BAP priority species and QOL – farmland bird indicators are highlighted in bold.

| Species        | n  | Proportion | Mean | Std  | Max | Total |
|----------------|----|------------|------|------|-----|-------|
| Skylark        | 10 | 91         | 2.8  | 2.2  | 8   | 28    |
| Willow Warbler | 10 | 91         | 3.5  | 2.2  | 8   | 35    |
| Magpie         | 10 | 91         | 4.4  | 2.3  | 8   | 44    |
| Jackdaw        | 10 | 91         | 23.0 | 20.5 | 59  | 230   |
| Rook           | 10 | 91         | 39.6 | 84.7 | 267 | 396   |
| Carrion Crow   | 10 | 91         | 10.6 | 14.4 | 49  | 106   |
| Goldfinch      | 10 | 91         | 3.5  | 2.0  | 7   | 35    |
| Linnet         | 10 | 91         | 8.8  | 14.5 | 49  | 88    |
| Swallow        | 11 | 100        | 8.2  | 7.7  | 27  | 90    |
| Wren           | 11 | 100        | 7.5  | 4.2  | 13  | 82    |
| Dunnock        | 11 | 100        | 3.3  | 1.8  | 7   | 36    |
| Robin          | 11 | 100        | 4.1  | 2.2  | 9   | 45    |
| Blackbird      | 11 | 100        | 5.4  | 3.1  | 11  | 59    |
| Whitethroat    | 11 | 100        | 5.5  | 5.9  | 22  | 61    |

**Table 12.** Occurrence and abundance of breeding birds occurring on ten or more BBS squares within the Ynys Mon ESA of a possible 11 BBS squares that intersect ESA land. (Total number of species recorded - 81). BAP priority species and QOL – farmland bird indicators are highlighted in bold.

| Species        | n  | Proportion | Mean | Std  | Max | Total |
|----------------|----|------------|------|------|-----|-------|
| Pheasant       | 10 | 91         | 1.8  | 1.0  | 4   | 18    |
| Herring Gull   | 10 | 91         | 13.5 | 8.6  | 28  | 135   |
| Swallow        | 10 | 91         | 14.0 | 14.9 | 54  | 140   |
| Willow Warbler | 10 | 91         | 8.9  | 4.7  | 17  | 89    |
| House Sparrow  | 10 | 91         | 19.0 | 15.5 | 54  | 190   |
| Chaffinch      | 10 | 91         | 9.7  | 6.0  | 22  | 97    |
| Greenfinch     | 10 | 91         | 6.4  | 5.5  | 15  | 64    |
| Wren           | 11 | 100        | 12.8 | 8.0  | 25  | 141   |
| Dunnock        | 11 | 100        | 4.2  | 2.8  | 9   | 46    |
| Blackbird      | 11 | 100        | 9.8  | 6.6  | 23  | 108   |
| Blue Tit       | 11 | 100        | 6.3  | 4.2  | 17  | 69    |
| Magpie         | 11 | 100        | 6.8  | 3.7  | 13  | 75    |
| Jackdaw        | 11 | 100        | 13.6 | 11.9 | 33  | 150   |
| Carrion Crow   | 11 | 100        | 12.9 | 8.9  | 36  | 142   |

**Table 13.** Occurrence and abundance of breeding birds occurring on ten or more BBS squares within the Breckland ESA of a possible 19 BBS squares that intersect ESA land. (Total number of species recorded - 97). BAP priority species and QOL – farmland bird indicators are highlighted in bold.

| Species                  | n  | Proportion | Mean | Std  | Max | Total |
|--------------------------|----|------------|------|------|-----|-------|
| Great Spotted Woodpecker | 10 | 53         | 1.8  | 1.5  | 5   | 18    |
| Swallow                  | 10 | 53         | 8.0  | 9.4  | 33  | 80    |
| Pied Wagtail             | 10 | 53         | 2.9  | 1.7  | 6   | 29    |
| Whitethroat              | 10 | 53         | 1.8  | 0.9  | 3   | 18    |
| Long-tailed Tit          | 10 | 53         | 2.4  | 2.1  | 8   | 24    |
| Greenfinch               | 10 | 53         | 4.1  | 3.3  | 10  | 41    |
| Linnet                   | 10 | 53         | 7.6  | 9.8  | 33  | 76    |
| Jay                      | 11 | 58         | 1.4  | 0.5  | 2   | 15    |
| Jackdaw                  | 11 | 58         | 13.2 | 11.1 | 40  | 145   |
| Stock Dove               | 12 | 63         | 2.4  | 1.3  | 5   | 29    |
| Song Thrush              | 12 | 63         | 2.3  | 1.3  | 5   | 27    |
| Mistle Thrush            | 12 | 63         | 4.3  | 3.0  | 12  | 51    |
| Starling                 | 12 | 63         | 23.9 | 52.1 | 186 | 287   |
| Goldfinch                | 12 | 63         | 4.2  | 3.1  | 13  | 50    |
| Goldcrest                | 13 | 68         | 4.4  | 2.9  | 9   | 57    |
| Coal Tit                 | 13 | 68         | 8.2  | 3.6  | 13  | 106   |
| Red-legged Partridge     | 14 | 74         | 7.4  | 5.9  | 22  | 103   |
| Green Woodpecker         | 14 | 74         | 2.3  | 1.1  | 5   | 32    |
| Willow Warbler           | 14 | 74         | 5.1  | 3.0  | 13  | 71    |
| Dunnock                  | 15 | 79         | 2.6  | 3.4  | 14  | 39    |
| Blackcap                 | 15 | 79         | 2.8  | 1.9  | 9   | 42    |
| Yellowhammer             | 16 | 84         | 4.1  | 2.5  | 9   | 66    |
| Skylark                  | 17 | 89         | 11.2 | 11.1 | 40  | 191   |
| Great Tit                | 17 | 89         | 4.6  | 3.3  | 12  | 78    |
| Robin                    | 18 | 95         | 4.4  | 2.7  | 11  | 79    |
| Blue Tit                 | 18 | 95         | 6.2  | 4.1  | 16  | 111   |
| Carrion Crow             | 18 | 95         | 5.2  | 1.9  | 9   | 93    |
| Pheasant                 | 19 | 100        | 11.1 | 9.0  | 37  | 211   |
| Woodpigeon               | 19 | 100        | 42.8 | 37.4 | 128 | 814   |
| Wren                     | 19 | 100        | 9.1  | 4.3  | 17  | 172   |
| Blackbird                | 19 | 100        | 6.3  | 8.7  | 32  | 120   |
| Chaffinch                | 19 | 100        | 15.3 | 4.8  | 24  | 290   |

**Table 14.** Occurrence and abundance of breeding birds occurring on ten or more BBS squares within the North Peak ESA of a possible 10 BBS squares that intersect ESA land. (Total number of species recorded - 77). BAP priority species and QOL – farmland bird indicators are highlighted in bold.

| Species      | n  | Proportion | Mean | Std  | Max | Total |
|--------------|----|------------|------|------|-----|-------|
| Carrion Crow | 10 | 77         | 5.5  | 6.3  | 20  | 55    |
| Wren         | 11 | 85         | 5.5  | 6.4  | 23  | 60    |
| Meadow Pipit | 13 | 100        | 25.7 | 26.2 | 80  | 334   |

**Table 15.** Occurrence and abundance of birds in all BBS transect sections that intersect ESAs in England. *n* is the number of occupied BBS transect sections, proportion is the proportion of total BBS transect sections that intersect ESA land, mean is the mean number of individuals counted per occupied transect section with associated standard deviation, max is the highest count on a BBS transect section and total is the total number of individuals counted. BAP priority species and QOL – farmland bird indicators are highlighted in bold.

| Species                  | n   | Proportion | Mean                   | Std  | Max     | Total       |
|--------------------------|-----|------------|------------------------|------|---------|-------------|
| Chaffinch                | 925 | 46         | 2.2                    | 1.4  | 17      | 2001        |
| Woodpigeon               | 850 | 42         | 3.8                    | 5.7  | 80      | 3263        |
| Wren                     | 833 | 41         | 1.8                    | 1.0  | 7       | 1475        |
| Blackbird                | 726 | 36         | 2.0                    | 1.5  | 19      | 1486        |
| Carrion Crow             | 711 | 35         | 2.7                    | 3.7  | 59      | 1888        |
| Blue Tit                 | 597 | 30         | 1.8                    | 1.1  | 9       | 1064        |
| Robin                    | 595 | 30         | 1.6                    | 1.3  | 26      | 944         |
| Skylark                  | 548 | 27         | 2.3                    | 17   | 11      | 1243        |
| Pheasant                 | 460 | 23         | 17                     | 1.5  | 18      | 774         |
| Great Tit                | 413 | 21         | 1.5                    | 0.9  | 7       | 618         |
| Willow Warbler           | 394 | 20         | 1.0                    | 0.0  | 8       | 588         |
| Swallow                  | 322 | 16         | 24                     | 2.5  | 30      | 765         |
| Magnie                   | 321 | 16         | 2. <del>4</del><br>1.5 | 0.9  | 7       | /00         |
| Meadow Pinit             | 319 | 16         | 3.2                    | 2.5  | 13      | 1026        |
| lackdaw                  | 315 | 16         | 0.∠<br>/ 1             | £.0  | 56      | 1280        |
| Song Thrush              | 306 | 10         | 4.1                    | 0.0  | 5       | 306         |
| Duppock                  | 207 | 15         | 1.3                    | 0.0  | 5       | 400         |
| Starling                 | 201 | 10         | 1.5                    | 12.5 | 150     | 1700        |
| Book                     | 202 | 14         | 0.5                    | 12.5 | 120     | 2200        |
| Greenfingh               | 259 | 13         | 0.0                    | 14.0 | 120     | ZZ90<br>517 |
| Blackcop                 | 209 | 13         | 2.0                    | 1.7  | 17      | 215         |
| Vallewhammar             | 200 | 10         | 1.2                    | 0.0  | 4       | 210         |
| Linnot                   | 244 | 12         | 1.0                    | 0.9  | 12      | 300<br>554  |
| Coldfingh                | 192 | 10         | 2.9                    | 4.1  | 43      | 204         |
| Goldminch                | 100 | 9          | 1.9                    | 1.4  | 13      | 304         |
| Chiffeboff               | 170 | 9          | 4.2                    | 4.0  | 25      | 141         |
| Mellerd                  | 176 | 9          | 1.2                    | 0.5  | ు<br>ఎఎ | 210         |
|                          | 169 | 0          | 2.9                    | 2.0  | 23      | 490         |
|                          | 101 | 8          | 1.4                    | 0.9  | 6       | 224         |
|                          | 100 | 0          | 1.4                    | 0.8  | 0       | 222         |
|                          | 157 | 8          | 1.0                    | 0.8  | 5       | 244         |
| Nistie Inrush            | 148 | 1          | 1.0                    | 1.2  | 8       | 231         |
|                          | 132 | 7          | 1.4                    | 0.7  | 4 7     | 191         |
| Collared Dove            | 132 | 1          | 1.6                    | 1.0  | 1       | 206         |
| Goldcrest                | 125 | 6          | 1.5                    | 1.1  | 11      | 184         |
| Black-neaded Gull        | 116 | 6          | 4.4                    | 4.8  | 30      | 509         |
|                          | 107 | 5          | 1.1                    | 0.4  | 4       | 116         |
| Green Woodpecker         | 106 | 5          | 1.1                    | 0.2  | 2       | 112         |
| Stock Dove               | 105 | 5          | 2.1                    | 3.5  | 33      | 219         |
| Swift                    | 103 | 5          | 3.7                    | 5.1  | 31      | 385         |
| Buzzard                  | 97  | 5          | 1.2                    | 0.5  | 3       | 121         |
| Lapwing                  | 97  | 5          | 3.5                    | 6.5  | 60      | 338         |
| House Martin             | 89  | 4          | 4.9                    | 8.5  | /5      | 435         |
| Red-legged Partridge     | 87  | 4          | 1.9                    | 1.2  | /       | 166         |
| Lesser Black-backed Gull | 87  | 4          | 5.3                    | 9.2  | 60      | 465         |
| Redstart                 | 85  | 4          | 1.3                    | 0.5  | 3       | 108         |
| Moorhen                  | 84  | 4          | 1.4                    | 0.7  | 4       | 116         |
| Great Spotted Woodpecker | 81  | 4          | 1.1                    | 0.3  | 2       | 87          |
| Herring Gull             | 77  | 4          | 3.9                    | 6.1  | 37      | 297         |

| Long-tailed Tit         | 77       | 4      | 2.2 | 1.9        | 12          | 166       |
|-------------------------|----------|--------|-----|------------|-------------|-----------|
| Garden Warbler          | 76       | 4      | 1.1 | 0.2        | 2           | 81        |
| Reed Bunting            | 76       | 4      | 1.3 | 0.5        | 4           | 97        |
| Grev Heron              | 75       | 1      | 1.0 | 0.0        | 5           | 97        |
| Wheatear                | 70       | т<br>З | 1.0 | 0.7        | 1           | 117       |
| Rood Warblor            | 70<br>66 | 3      | 2.1 | 1.2        | 5           | 120       |
|                         | 61       | 3      | 2.1 | 1.2        | 5           | 107       |
|                         | 50       | 3      | 1.0 | 1.3        | 1           | 107       |
| Jay<br>Ded Crewes       | 58       | 3      | 1.2 | 0.4        | 3           | 10        |
| Red Grouse              | 55       | 3      | 2.5 | 1.6        | 9           | 139       |
| Coot                    | 55       | 3      | 2.3 | 1.9        | 9           | 126       |
| Mute Swan               | 54       | 3      | 3.1 | 4.2        | 30          | 170       |
| Shelduck                | 51       | 3      | 3.3 | 2.7        | 12          | 167       |
| Treecreeper             | 49       | 2      | 1.2 | 0.4        | 2           | 59        |
| Canada Goose            | 48       | 2      | 5.1 | 9.2        | 53          | 244       |
| Kestrel                 | 46       | 2      | 1.0 | 0.2        | 2           | 48        |
| Tree Pipit              | 46       | 2      | 1.5 | 0.9        | 4           | 68        |
| Redshank                | 45       | 2      | 2.5 | 2.1        | 10          | 113       |
| Nuthatch                | 42       | 2      | 1.3 | 0.6        | 4           | 53        |
| Oystercatcher           | 37       | 2      | 2.5 | 2.0        | 9           | 91        |
| Bullfinch               | 37       | 2      | 1.3 | 0.5        | 2           | 48        |
| Turtle Dove             | 36       | 2      | 1.4 | 1.1        | 7           | 52        |
| Yellow Wagtail          | 31       | 2      | 1.4 | 0.6        | 3           | 42        |
| Raven                   | 27       | 1      | 1.4 | 0.7        | 3           | 38        |
| Spotted Flycatcher      | 26       | 1      | 1.2 | 0.4        | 2           | 31        |
| Corn Bunting            | 25       | 1      | 1.6 | 1.2        | 6           | 39        |
| Cormorant               | 24       | 1      | 1.5 | 1.1        | 6           | 36        |
| Tufted Duck             | 24       | 1      | 3.2 | 3.4        | 17          | 77        |
| Whinchat                | 23       | 1      | 1.9 | 1.1        | 5           | 43        |
| Marsh Tit               | 23       | 1      | 1.6 | 0.6        | 3           | 36        |
| Sparrowhawk             | 21       | 1      | 1.0 | 0.0        | 2           | 22        |
| Feral Pigeon            | 19       | 1      | 5.2 | 9.0        | 40          | 98        |
| Grev Wagtail            | 19       | 1      | 1.2 | 0.0        | 2           | 22        |
| Grev Partridge          | 17       | 1      | 1.2 | 0.4        | 2           | 20        |
| Lesser Whitethroat      | 17       | 1      | 1.7 | 0.0        | 2           | 10        |
| Greylag Goose           | 16       | 1      | 5.1 | 0.5<br>5 / | 22          | 81        |
| Spipo                   | 10       | 1      | 1.6 | 1.2        | 6           | 25        |
| Woodlark                | 10       | 1      | 1.0 | 1.3        | 0           | 20        |
| Died Elyesteher         | 10       | 1      | 1.2 | 0.4        | 2           | 19        |
| Common Torn             | 16       | 1      | 1.3 | 0.6        | い<br>い<br>い | ∠ I<br>10 |
|                         | 10       | 1      | 1.2 | 0.0        | 3           | 10        |
| Little Grebe            | 14       |        | 1.4 | 0.0        | 4           | 19        |
| Stonechat               | 14       | 1      | 1.7 | 0.9        | 4           | 24        |
| SISKIN                  | 13       | 1      | 2.1 | 1.5        | 6           | 27        |
| Golden Plover           | 12       | 1      | 4.8 | 8.4        | 30          | 57        |
| Dipper                  | 12       | 1      | 1.2 | 0.4        | 2           | 14        |
| Gadwall                 | 11       | 1      | 1.7 | 0.8        | 3           | 19        |
| Pochard                 | 11       | 1      | 1.9 | 1.8        | (           | 21        |
| Whimbrel                | 11       | 1      | 3.2 | 2.8        | 9           | 35        |
| Common Gull             | 11       | 1      | 1.7 | 1.7        | 6           | 19        |
| Tawny Owl               | 11       | 1      | 1.1 | 0.3        | 2           | 12        |
| Wood Warbler            | 11       | 1      | 1.2 | 0.4        | 2           | 13        |
| Willow Tit              | 9        | 0      | 1.2 | 0.4        | 2           | 11        |
| Stone Curlew            | 8        | 0      | 1.8 | 0.7        | 3           | 14        |
| Sand Martin             | 8        | 0      | 3.3 | 3.1        | 10          | 26        |
| Nightingale             | 8        | 0      | 1.5 | 1.1        | 4           | 12        |
| Shoveler                | 7        | 0      | 1.7 | 1.0        | 3           | 12        |
| Great Black-backed Gull | 7        | 0      | 1.9 | 1.1        | 4           | 13        |
| Ring Ouzel              | 7        | 0      | 1.4 | 0.5        | 2           | 10        |
| Tree Sparrow            | 7        | 0      | 2.1 | 2.0        | 6           | 15        |
| Great Crested Grebe     | 6        | 0      | 2.2 | 1.2        | 4           | 13        |
| Little Owl              | 6        | 0      | 1.2 | 0.4        | 2           | 7         |

| Short-eared Owl           | 6 | 0 | 1.3   | 0.8 | 3 | 8  |
|---------------------------|---|---|-------|-----|---|----|
| Lesser Redpoll            | 6 | 0 | 1.8   | 0.4 | 2 | 11 |
| Marsh Harrier             | 5 | 0 | 1.2   | 0.4 | 2 | 6  |
| Lesser Spotted Woodpecker | 5 | 0 | 1.4   | 0.5 | 2 | 7  |
| Goosander                 | 4 | 0 | 1.3   | 0.5 | 2 | 5  |
| Peregrine                 | 4 | 0 | 1.0   | 0.0 | 1 | 4  |
| Common Sandpiper          | 4 | 0 | 1.0   | 0.0 | 1 | 4  |
| Cetti's Warbler           | 4 | 0 | 1.0   | 0.0 | 1 | 4  |
| Merlin                    | 3 | 0 | 1.3   | 0.6 | 2 | 4  |
| Avocet                    | 3 | 0 | 1.7   | 0.6 | 2 | 5  |
| Turnstone                 | 3 | 0 | 4.0   | 2.0 | 6 | 12 |
| Little Tern               | 3 | 0 | 1.3   | 0.6 | 2 | 4  |
| Grasshopper Warbler       | 3 | 0 | 1.0   | 0.0 | 1 | 3  |
| Barnacle Goose            | 2 | 0 | 1.0   | 0.0 | 1 | 2  |
| Egyptian Goose            | 2 | 0 | 1.5   | 0.7 | 2 | 3  |
| Goshawk                   | 2 | 0 | 1.0   | 0.0 | 1 | 2  |
| Ringed Plover             | 2 | 0 | 2.0   | 0.0 | 2 | 4  |
| Woodcock                  | 2 | 0 | 1.0   | 0.0 | 1 | 2  |
| Black-tailed Godwit       | 2 | 0 | 4.5   | 4.9 | 8 | 9  |
| Spotted Redshank          | 2 | 0 | 1.5   | 0.7 | 2 | 3  |
| Greenshank                | 2 | 0 | 1.0   | 0.0 | 1 | 2  |
| Kingfisher                | 2 | 0 | 1.0   | 0.0 | 1 | 2  |
| Fieldfare                 | 2 | 0 | 5.0   | 1.4 | 6 | 10 |
| Common Crossbill          | 2 | 0 | 1.0   | 0.0 | 1 | 2  |
| Shag                      | 1 | 0 | 1.0 . |     | 1 | 1  |
| Brent Goose               | 1 | 0 | 1.0 . |     | 1 | 1  |
| Mandarin                  | 1 | 0 | 1.0 . |     | 1 | 1  |
| Teal                      | 1 | 0 | 7.0 . |     | 7 | 7  |
| Hen Harrier               | 1 | 0 | 1.0 . |     | 1 | 1  |
| Quail                     | 1 | 0 | 1.0 . |     | 1 | 1  |
| Green Sandpiper           | 1 | 0 | 1.0 . |     | 1 | 1  |
| Barn Owl                  | 1 | 0 | 1.0 . |     | 1 | 1  |
| Redwing                   | 1 | 0 | 2.0 . |     | 2 | 2  |
| Twite                     | 1 | 0 | 1.0 . |     | 1 | 1  |

**Table 16.**Occurrence and abundance of breeding birds in all BBS transect sections that intersect<br/>English ESA agreement land. n is the number of occupied BBS transect sections,<br/>proportion is the proportion of total BBS transect sections that intersect ESA agreement<br/>land, mean is the mean number of individuals counted per occupied transect section with<br/>associated standard deviation, max is the highest count on a BBS transect section and total<br/>is the total number of individuals counted. BAP priority species and QOL – farmland bird<br/>indicators are highlighted in bold.

| Species                  | п   | Proportion | Mean | Std  | Max    | Total    |
|--------------------------|-----|------------|------|------|--------|----------|
| Chaffinch                | 488 | 62         | 2.2  | 1.4  | 10     | 1063     |
| Wren                     | 429 | 54         | 1.7  | 0.9  | 6      | 731      |
| Woodpigeon               | 399 | 51         | 3.4  | 4.1  | 34     | 1356     |
| Carrion Crow             | 394 | 50         | 2.6  | 2.4  | 20     | 1005     |
| Blackbird                | 391 | 49         | 2.0  | 1.6  | 19     | 787      |
| Blue Tit                 | 314 | 40         | 1.9  | 1.1  | 7      | 583      |
| Robin                    | 310 | 39         | 1.7  | 1.6  | 26     | 512      |
| Skylark                  | 264 | 33         | 1.9  | 1.3  | 8      | 513      |
| Willow Warbler           | 240 | 30         | 1.5  | 0.8  | 4      | 366      |
| Great Tit                | 208 | 26         | 1.5  | 0.9  | 7      | 308      |
| Pheasant                 | 205 | 26         | 1.5  | 0.9  | 6      | 313      |
| Meadow pipit             | 199 | 25         | 3.2  | 2.5  | 13     | 646      |
| Swallow                  | 192 | 24         | 2.3  | 2.2  | 23     | 449      |
| Magpie                   | 179 | 23         | 1.5  | 0.9  | 6      | 275      |
| Song Thrush              | 161 | 20         | 13   | 0.6  | 5      | 213      |
| Dunnock                  | 157 | 20         | 1.4  | 0.7  | 5      | 213      |
| Jackdaw                  | 157 | 20         | 39   | 6.4  | 56     | 609      |
| Book                     | 134 | 17         | 89   | 15.8 | 120    | 1190     |
| Yellowhammer             | 120 | 15         | 15   | 0.8  | 6      | 183      |
| Starling                 | 110 | 15         | 6.1  | 9.8  | 55     | 720      |
| Greenfinch               | 117 | 15         | 1 0  | 17   | 17     | 221      |
| Blackcan                 | 11/ | 10         | 1.3  | 0.6  | 17     | 152      |
| Mallard                  | 04  | 14         | 2.5  | 17   | 4      | 235      |
|                          | 94  | 12         | 2.5  | 1.7  | 6      | 235      |
|                          | 93  | 12         | 1.0  | 0.0  | 10     | 133      |
| Goldinch                 | 93  | 12         | 1.9  | 1.3  | 10     | 177      |
| Curlow                   | 00  | 10         | 2.7  | 2.9  | 20     | 230      |
| Cullew                   | 01  | 10         | 1.3  | 0.6  | 4      | 100      |
|                          | 78  | 10         | 1.3  | 0.6  | 3      | 101      |
| House Sparrow            | 75  | 9          | 3.8  | 4.0  | 25     | 280      |
|                          | 12  | 9          | 1.6  | 1.2  | Ö      | 113      |
| Reustart                 | 68  | 9          | 1.3  | 0.5  | 3      | 80       |
| Buzzaro                  | 00  | 8          | 1.2  | 0.5  | う<br>マ | 81<br>00 |
|                          | 66  | 8          | 1.5  | 1.1  | 1      | 96       |
|                          | 54  | (          | 1.5  | 0.6  | 3      | 81       |
|                          | 53  | (          | 2.6  | 1.6  | 9      | 137      |
| Collared Dove            | 52  | (          | 1.4  | 0.7  | 4      | 12       |
|                          | 50  | 6          | 1.1  | 0.4  | 4      | 54       |
| Black-headed Gull        | 49  | 6          | 5.0  | 5.1  | 30     | 243      |
| Lapwing                  | 48  | 6          | 4.2  | 8.8  | 60     | 202      |
| vvneatear                | 48  | 6          | 1./  | 0.8  | 4      | 81       |
| Lesser Black-backed Gull | 47  | 6          | 7.8  | 11.9 | 60     | 366      |
| Stock Dove               | 45  | 6          | 2.6  | 5.2  | 33     | 117      |
| Swift                    | 42  | 5          | 3.3  | 3.8  | 21     | 138      |
| Great Spotted Woodpecker | 41  | 5          | 1.0  | 0.2  | 2      | 43       |
| Reed Bunting             | 41  | 5          | 1.3  | 0.4  | 2      | 52       |
| Moorhen                  | 40  | 5          | 1.5  | 0.9  | 4      | 59       |
| Herring Gull             | 39  | 5          | 4.4  | 6.3  | 28     | 173      |

| Green Woodpecker          | 39       | 5 | 1.1  | 0.2  | 2       | 41       |
|---------------------------|----------|---|------|------|---------|----------|
| Garden Warbler            | 38       | 5 | 1 1  | 0.3  | 2       | 41       |
| Goldcrest                 | 37       | 5 | 1.1  | 0.8  | 5       | 51       |
| Grev Heron                | 36       | 5 | 1.4  | 0.0  | 3       | /8       |
| Sedge Warbler             | 36       | 5 | 1.0  | 13   | 6       | 40<br>65 |
| House Martin              | 34       | 1 | 6.1  | 12.6 | 75      | 207      |
| Pood Warbler              | 22       | 4 | 0.1  | 12.0 | 75<br>5 | 201      |
|                           | აა<br>22 | 4 | 2.0  | 1.2  | 5       | 00<br>72 |
|                           | 32       | 4 | 2.3  | 2.0  | 9       | 13       |
| Long-tailed Int           | 32       | 4 | 2.1  | 1.2  | 6       | 00       |
| Mute Swan                 | 31       | 4 | 3.7  | 5.3  | 30      | 110      |
|                           | 28       | 4 | 1.5  | 0.8  | 4       | 42       |
| Ireecreeper               | 28       | 4 | 1.2  | 0.4  | 2       | 33       |
| Jay                       | 28       | 4 | 1.2  | 0.4  | 2       | 33       |
| Shelduck                  | 25       | 3 | 3.3  | 3.0  | 12      | 83       |
| Kestrel                   | 22       | 3 | 1.0  | 0.2  | 2       | 23       |
| Nuthatch                  | 22       | 3 | 1.2  | 0.4  | 2       | 27       |
| Bullfinch                 | 21       | 3 | 1.2  | 0.4  | 2       | 25       |
| Redshank                  | 20       | 3 | 2.4  | 2.2  | 10      | 48       |
| Oystercatcher             | 19       | 2 | 2.4  | 1.8  | 8       | 45       |
| Canada Goose              | 18       | 2 | 7.7  | 13.7 | 53      | 138      |
| Raven                     | 18       | 2 | 1.2  | 0.5  | 3       | 22       |
| Red-legged Partridge      | 17       | 2 | 2.0  | 1.1  | 5       | 34       |
| Pied Flycatcher           | 15       | 2 | 1.3  | 0.6  | 3       | 20       |
| Turtle Dove               | 14       | 2 | 1.4  | 0.8  | 3       | 20       |
| Whinchat                  | 14       | 2 | 2.1  | 1.3  | 5       | 29       |
| Cormorant                 | 13       | 2 | 1.1  | 0.3  | 2       | 14       |
| Grev Wagtail              | 13       | 2 | 1.2  | 0.4  | 2       | 16       |
| Spotted Flycatcher        | 13       | 2 | 1.3  | 0.5  | 2       | 17       |
| Sparrowhawk               | 12       | 2 | 1.1  | 0.3  | 2       | 13       |
| Golden Plover             | 12       | 2 | 4.8  | 84   | 30      | 57       |
| Marsh Tit                 | 12       | 2 | 1.5  | 0.7  | 3       | 18       |
| Yellow Wagtail            | 11       | 1 | 1.0  | 0.7  | 2       | 12       |
| Tuffed Duck               | 9        | 1 | 3.4  | 5.0  | 17      | 31       |
| Snipe                     | à        | 1 | 2.0  | 17   | 6       | 18       |
| Dipper                    | a        | 1 | 1.0  | 0.4  | 2       | 10       |
| Bochard                   | 9<br>8   | 1 | 1.2  | 2.0  | 2       | 18       |
| Grov Partridge            | 0        | 1 | 2.5  | 2.0  | 2       | 10       |
| Godwall                   | 7        | 1 | 1.0  | 0.5  | 2       | 12       |
| Sickin                    | 7        | 1 | 1.9  | 1.9  | 5       | 10       |
| JISKIII                   | 6        | 1 | 2.0  | 1.0  | 0       | 10       |
|                           | b<br>C   | 1 | 1.2  | 0.4  | 2       |          |
|                           | ю<br>С   | 1 | 10.3 | 14.9 | 40      | 62       |
| Diag Outed                | b<br>C   | 1 | 1.2  | 0.4  | 2       | 1        |
|                           | 6        | 1 | 1.3  | 0.5  | 2       | 8        |
| Tree Sparrow              | 6        | 1 | 2.3  | 2.2  | 6       | 14       |
| Corn Bunting              | 6        | 1 | 1.0  | 0    | 1       | 6        |
| Snoveler                  | 5        | 1 | 2.0  | 1.0  | 3       | 10       |
| vvhimbrei                 | 5        | 1 | 2.6  | 2.5  | 1       | 13       |
| Sand Martin               | 5        | 1 | 3.8  | 3.8  | 10      | 19       |
| Stonechat                 | 5        | 1 | 2.0  | 1.2  | 4       | 10       |
| Great Crested Grebe       | 4        | 1 | 1.5  | 0.6  | 2       | 6        |
| Greylag Goose             | 4        | 1 | 9.0  | 9.5  | 22      | 36       |
| Marsh Harrier             | 4        | 1 | 1.3  | 0.5  | 2       | 5        |
| Common Gull               | 4        | 1 | 2.3  | 2.5  | 6       | 9        |
| Great Black-backed Gull   | 4        | 1 | 2.5  | 1.0  | 4       | 10       |
| Common Tern               | 4        | 1 | 1.0  | 0    | 1       | 4        |
| Short-eared Owl           | 4        | 1 | 1.0  | 0    | 1       | 4        |
| Lesser Spotted Woodpecker | 4        | 1 | 1.5  | 0.6  | 2       | 6        |
| Lesser Whitethroat        | 4        | 1 | 1.0  | 0    | 1       | 4        |
| Willow Tit                | 4        | 1 | 1.5  | 0.6  | 2       | 6        |
| Merlin                    | 3        | 0 | 1.3  | 0.6  | 2       | 4        |

| Peregrine           | 3 | 0 | 1.0 | 0   | 1 | 3 |
|---------------------|---|---|-----|-----|---|---|
| Common Sandpiper    | 3 | 0 | 1.0 | 0   | 1 | 3 |
| Nightingale         | 3 | 0 | 2.3 | 1.5 | 4 | 7 |
| Cetti's Warbler     | 3 | 0 | 1.0 | 0   | 1 | 3 |
| Wood Warbler        | 3 | 0 | 1.0 | 0   | 1 | 3 |
| Lesser Redpoll      | 3 | 0 | 1.7 | 0.6 | 2 | 5 |
| Goosander           | 2 | 0 | 1.0 | 0   | 1 | 2 |
| Spotted Redshank    | 2 | 0 | 1.5 | 0.7 | 2 | 3 |
| Little Owl          | 2 | 0 | 1.0 | 0   | 1 | 2 |
| Shag                | 1 | 0 | 1.0 |     | 1 | 1 |
| Egyptian Goose      | 1 | 0 | 2.0 |     | 2 | 2 |
| Avocet              | 1 | 0 | 2.0 |     | 2 | 2 |
| Woodcock            | 1 | 0 | 1.0 |     | 1 | 1 |
| Black-tailed Godwit | 1 | 0 | 1.0 |     | 1 | 1 |
| Greenshank          | 1 | 0 | 1.0 |     | 1 | 1 |
| Green Sandpiper     | 1 | 0 | 1.0 |     | 1 | 1 |
| Turnstone           | 1 | 0 | 2.0 |     | 2 | 2 |
| Little Tern         | 1 | 0 | 1.0 |     | 1 | 1 |
| Barn Owl            | 1 | 0 | 1.0 |     | 1 | 1 |
| Kingfisher          | 1 | 0 | 1.0 |     | 1 | 1 |
| Fieldfare           | 1 | 0 | 6.0 |     | 6 | 6 |

**Table 17.** Number of sites surveyed in major BTO surveys that wholly or partially intersect ESA and<br/>ESA agreement land in 1999 in England. Percentage of the total sites surveyed is shown<br/>in parentheses.

| Survey | No. of<br>sites in ESAs | Sites on agreement land | Total sites surveyed |
|--------|-------------------------|-------------------------|----------------------|
| BBS    | 193 (12)                | 129 (6)                 | 1782                 |
| WeBS   | 370 (13)                | 158 (4)                 | 3405                 |
| WBS    | 10 (12)                 | 9 (10)                  | 90                   |
| CBC    | 21 (12)                 | 7 (4)                   | 190                  |
| BWWM   | 340 (23)                | 175 (11)                | 1464                 |
| WBBS   | 16 (12)                 | 12 (8)                  | 130                  |





**Figure 2.** The distribution of all Breeding Bird Survey (BBS) squares surveyed in 1999 in England and Wales in relation to ESAs and English ESA agreement land.



**Figure 3.** The distribution of all Breeding Bird Survey (BBS) squares surveyed in 1999 in the east of England in relation to ESA and ESA agreement land.



**Figure 4.** The distribution of all Breeding Bird Survey (BBS) squares surveyed in 1999 in the southwest of England in relation to ESA and ESA agreement land.



**Figure 5.** The distribution of all Breeding Bird Survey (BBS) squares surveyed in 1999 in the south of England in relation to ESA and ESA agreement land.



**Figure 6.** The distribution of all Breeding Bird Survey (BBS) squares surveyed in 1999 in Wales and the west Midlands in relation to ESA and ESA agreement land.



**Figure 7.** The distribution of all Breeding Bird Survey (BBS) squares surveyed in 1999 in the north of England in relation to ESA and ESA agreement land.



**Figure 8.** The distribution of all Wetland Birds Survey (WeBS) sites surveyed in 1999 in England and Wales in relation to ESA and ESA agreement land.



Figure 9. The distribution of all Common Bird Census (CBC) squares surveyed in 1999 in England and Wales in relation to ESA and ESA agreement land.



Figure 10. The distribution of all Waterways Bird Survey (WBS) sites surveyed in 1999 in England and Wales in relation to ESA and ESA agreement land.



Figure 11. The distribution of all Breeding Waders of Wet Meadows Survey (BWWM) sites surveyed in 2002 in England and Wales in relation to ESA and ESA agreement land.



Figure 12. The distribution of all Waterways Breeding Bird Survey (WBBS) sites surveyed in 1999 in England and Wales in relation to ESA and ESA agreement land.



#### **APPENDIX 1**



BBS indices of Skylark in England and Wales between 1995-2000. Results are means  $\pm$  95% CI.

BBS indices of Lapwing in England and Wales between 1995-2000. Results are means  $\pm$  95% CI.

