

House Sparrow Project

Title

House Sparrow Project

Description and Summary of Results

The House Sparrow *Passer domesticus*, a species once so numerous that it was considered a pest, underwent an estimated 68% decline in the UK between 1977 and 2003, resulting in the species being placed on the Red List of Species of Conservation Concern. The estimate was, however, biased towards farmland in the more heavily populated areas of southern and eastern UK. Subsequent analyses suggested that the population changes had shown marked regional variation, and that declines were particularly severe in urban environments, although there appeared to be much variation between individual cities. For example, declines were detected in London, Dublin, Glasgow and Edinburgh but not in Manchester.

Declines on farmland seem most likely to be influenced by decreases in survival with changing farming practice affecting food availability. However, the timing of the declines in urban areas was different, and the mechanisms are likely to be different too. Increased predation, pollution, reduction in food supply for the chicks and reduced availability of nest sites have all been suggested as reasons but there is no strong evidence to support any of them. There are though some indications: 1) in some cities the species was found to be most abundant, and the population decline less, in socially deprived areas -- more waste ground and less managed gardens (greater food availability?), fewer home improvements (more nest sites available?); 2) in some places nesting House Sparrows were more likely to occur in older properties (built before 1919) and in medium-aged properties (20-60 years old) that had not had roof repairs (more nest sites available?); 3) in some places House Sparrows were commoner in a suburban area with a higher bush cover and, in particular, with native species of bush (more food available?); 4) one study found the amount of green space to be important in determining density in urban environments but there was also a correlation with building density (the importance of feeding and nesting sites in close proximity to each other?); but another study found no significant correlation between sparrow density and either the area of urban green space (including gardens) or housing density.

The House Sparrow Project was set up to investigate some of these more closely, using sample quadrants in 1223 1-km squares as survey units with up to 4 visits. Within residential habitat House Sparrows occurred at higher densities when gardens were present, and density increased far more steeply in 'with garden' areas than in those without. Gardens clearly form an important habitat although the relatively small difference between 'with' and 'without' may have been due in part to the difficulties of surveying in such areas -- some areas classed as 'without gardens' may actually have had gardens at the rear of the houses, but which could not be seen from public rights of way.

The second most important predictor of House Sparrow density at the whole square level in areas of high human population was allotments, but it was less prominent in areas of lower

human density. The density estimates for chirping males in allotments were lower, suggesting that this habitat is more important for feeding than for breeding. The highest density estimates overall were for areas classed as 'farm buildings', and these were also key predictors at the whole square level in low human density landscapes. Rural housing has some of the highest estimated House Sparrow densities, and the species has long been associated with farmyards, but the increased cleanliness of farmyards and, in particular, the improved transport and storage of grain, coupled with a lower availability of nest sites in modern buildings, could have been potential factors in the decline of farmland populations. The high overall density was also accompanied by a very large variation, suggesting a wide range in the quality of farm buildings for sparrows.

Methods of Data Capture

A stratified random sampling technique was used to select representative 1-km squares containing urbanised habitat. Three strata were defined and the country was divided into regions (based on Government Office regions). In all 2420 1-km squares were targeted for coverage and observers were asked to survey one quadrant (500m x 500m square) within each.

Observers were asked to walk along all pavements, paths and roads, into parks and allotments and along field boundaries, with the aim of mapping the location of all House Sparrows detected (in the habitat patch in which they were first seen or heard). Chirping males, other males, females and 'unsexed' birds were recorded separately. Two visits were requested in the summer 2003, one in May and one in June (with a minimum of 1 week between them), one in the autumn (October) 2003 and one in summer (May or June) 2004 although in practice many were not visited in all periods.

Before the bird survey visits, surveyors were requested to make a habitat recording visit. All roads and paths in the survey squares were walked and habitat was recorded into discrete patches that were larger than 'half a tennis court' (ca 130m²). These patches were drawn as accurately as possible onto the site map, and each patch was given a number corresponding to a pre-selected list of 30 habitat types, a list which was reduced to 13 habitat variables for analysis. The area of each habitat patch was determined for each survey square. (For the analysis, habitat patches of less than 1ha were excluded in order to avoid misleadingly high densities as a result of small patch size.)

Purpose of Data Capture

To determine the habitat features which are preferred by House Sparrows in urban and suburban areas.

Geographic Coverage

Sample 500m x 500m squares were selected from urban areas throughout the UK.

Temporal Coverage

The summer and autumn of 2003 and summer of 2004. Visits were requested in May and June 2003 with a minimum of 1 week separating the two visits, one in October 2003 and one in May or June 2004.

Other Interested parties

It was run entirely by the BTO through Garden BirdWatch. It was funded mainly via the BTO House Sparrow Appeal (an appeal to BTO supporters) and, in particular, the John Spedan Lewis Charitable Trust, Leslie Mary Carter Charitable Trust, Salter Charitable Trust and Elsie Mary Elkes Charitable Trust.

Organiser(s)

Rosie Cleary and Mike Toms

Current Staff Contact

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Publications

The main report of the survey is:

Chamberlain, D.E., Toms, M.P., Cleary-McHarg, R. & Banks, A.N. 2007. House Sparrow *Passer domesticus* habitat use in urbanized landscapes. *Journal of Ornithology* 148: 453-462.

The survey was noticed in *BTO News* numbers 248 and 274 and in *Bird Table*.

Available from NBN?

No.

Computer data -- location

BTO Windows network central area.

Computer data -- outline contents

One directory contains 4 bird, 4 habitat and 3 weather data files. Other directories contain some programs, analyses, reports and papers relating to the development of the project.

Computer data -- description of contents

The data directory contains:

4 bird data files (Excel): summer03v1, summer03v2, autumn03, summer04: Columns are: Visit number; sppno -- 1='MALE_C'; 2='MALE'; 3='FEMALE'; 4='CAT'; 5='SH'; 6='MG'; 7='HSXX'; Date (as DD.MM.YYYY); Count; Qual -- seems to be A or E; Table_aftw -- occasional 0; Over2days -- (almost) all=0; id (line number in file); Country -- BRITAIN or IRELAND; grid1km -- the 1-km square; Quarter -- SW, SE, NW, NE; Cgrid -- central grid of 500m square (2 letter and 6 figures); Habno -- 1='PARKS'; 2='SCHOO'; 3='SHOPL'; 4='SHOPC'; 5='FFOOD'; 6='BUSST'; 7='TRAIN'; 8='TOWNC'; 9='ALLOT'; 10='WASTE'; 11='RDUMP'; 12='FARMS'; 13='RUINS'; 14='ORCHA'; 15='WOODS'; 16='GRASL'; 17='GRASS'; 18='ARABL'; 19='OCOUN'; 20='LAKES'; 21='RIVER'; 22='PHONE'; 23='PETRO'; 24='ANIMS'; 25='FACTO'; 26='RAILL'; 27='GARNO'; 28='GARDE'; ' 'MISCE'; Hab_change; Area; patch

4 habitat files (2 Excel, 2 CSV): Not clear exactly what the fields mean

3 weather files (Excel): Columns are: GBW number; 1-km square +quadrant; Date; Start Time; End Time; Cloud; Rain; Wind; Temperature; Visibility: all these 5 as A, B or C

Other directories: Papers and reports: contains copies of papers, reports, proposals letters etc; HQPC archive: contains various emails and papers relating primarily to the development of the project (ex Humphrey Crick); Analyses and Misc (most zipped): contains various programs and analyses, many from Dan Chamberlain.

Information held in BTO Archives

Four archive boxes contain all the forms containing the maps.

Notes on Access and Use

Other information needed

Notes on Survey Design

Stratified random sampling techniques were employed to target representative 1-km squares of urbanized habitat in the UK. The habitat categories 'suburban/rural development' and 'continuous urban development' from the Countryside (CS) 2000 landcover data were combined to form one class -- 'human cover'. This was used to stratify the 266000 1-km squares within the UK into classes of human coverage.

Three strata were defined, based on the cumulative square root $f(y)$ rule (see Krebs 1989, *Ecological Methodology*) and on visual inspection of square distribution: A = 25-49.9% (9502 UK 1-km squares); B = 50-74.9% (5804 squares); and C = 75-100% (4564 squares). Squares with <25% human cover were not selected.

Optimal allocation was used to determine the requisite number of squares in each stratum, based on House Sparrow density data from a pilot study, assuming a constant sampling cost. To ensure proportional geographic representation, datasets containing all relevant squares for each stratum were ordered by British grid reference. The data were then partitioned into subsets, and one square was randomly selected from each sub-sample. Following this procedure, the number of squares allocated to each stratum was examined at a regional level. Random re-sampling occurred where necessary so that each region/stratum combination contained at least 44 targeted squares. In total, 2420 squares were targeted for coverage: 997 squares from stratum A, 762 from B and 661 from C. To maximize take-up of survey squares, the four nearest squares to the residential home square of each participant in BTO Garden BirdWatch were identified, with an upper limit of

5km between the edges of residential and targeted grid squares. In this way, it was possible to match volunteers to nearby squares and approach the most likely volunteers.

Specific Issues for Analysis

Four visits were requested, but not all squares received four visits. The number of squares surveyed for Visits 1-4 respectively was 1223, 1175, 918 and 736, and there was a highly significant overall difference in numbers of birds between squares with those which had only one visit having a much lower count than squares that were visited more often. Observers seemed less likely to make repeat visits to a square if the species was initially absent or scarce. Hence all statistical analyses were undertaken separately by visit, and the focus was on the first visit as that was less biased towards habitats where House Sparrows were numerous.