

Winter Skylarks 1997/98

Title

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Description and Summary of Results

Numbers of breeding Skylarks *Alauda arvensis* declined by 58% in lowland British farmland between 1975 and 1994 but the species remained very widespread throughout the UK. The main declines occurred in the mid- to late 1970s but the species continued to decline later on. Nesting success (per breeding attempt), however, had increased since the 1960s, indicating that the population decline was likely to have been caused either by a decrease in the number of annual nesting attempts or an increase in mortality, or a combination. Changes in farm cropping have limited the number of broods Skylarks have within a season, but one study also demonstrated that over-winter survival of adult Skylarks was lowest during the early 1980s.

Most studies of Skylark ecology have focused on the breeding season despite the gap in knowledge of requirements during the winter period for this and several other species subject to Biodiversity Action Plans. The main habitat in winter is farmland, although the importance of British farmland in a European context is difficult to assess. Some authors suggest that continental immigrants winter in Britain whereas others find no evidence for significant immigration, although the power to detect movements of Skylarks into Britain may be small with existing ringing data. Nonetheless, the importance of an understanding of winter habitat use is essential when designing appropriate strategies of farmland management for conserving Skylarks.

To help determine the needs of the species in winter an extensive survey of wintering Skylarks was carried out in 1997/98 in lowland Britain, designed to quantify the availability and use of habitat and to complement intensive winter studies carried out on individual farms.

In all, 541 of the 1000 1-km squares selected for coverage were surveyed (by 469 observers). Of these, 474 were visited three times, 48 twice and 19 once with dates well spaced through the winter period. Overall 64% were occupied by Skylarks on one or more visits, and presence differed significantly between land-use strata from 80% of saltmarsh squares occupied to only 14% of marginal upland squares.

The median and range of densities were similar in arable and pastoral squares, but densities differed significantly between strata (arable: marginal upland: pastoral: saltmarsh = 33: 4: 20: 100) although no temporal change in abundance was detected.

Grazed grass was the most widespread habitat, estimated to cover 4.1 million ha (37% of farmland), cereal crops 24%, ungrazed grass a further 14%, and cereal stubbles covered 629000ha (5.7% of farmland), of which 46% was classed as "weedy". However Skylarks did not use these in the same proportions. Cereal stubble was the major habitat used more than expected by chance throughout the winter, and weedy stubble fields were used more than clean ones. Stubbles of oilseed rape, root crops and other crops were rare, but were used more than expected during at least one third of the winter. Fields with oilseed rape

were used in proportion to their availability in early winter but were positively selected in mid- and late winter; other crops were mostly used in proportion to their availability. Skylark flocks showed a positive selection of large fields. Field size differed between crop types meaning that the relationship was potentially influenced by selection of a habitat type usually found in large fields but this was found to be unlikely. The largest fields were oilseed rape crops ($7.0 \pm \text{se } 0.5\text{ha}$) and cereal crops ($6.6 \pm 0.2\text{ha}$) which were occasionally selected and used in proportion to availability respectively. In contrast, positively selected weedy and clean cereal stubble fields were only $5.6 \pm 0.5\text{ha}$ and $5.4 \pm 0.4\text{ha}$ respectively. The smallest fields were grass fields ($3.1 \pm 0.1\text{ha}$) which were used in proportion to availability or avoided.

Methods of Data Capture

The survey units were 1-km squares of the National Grid which were selected using a stratified random sampling approach from within the Skylark's winter range. The 1997 BTO survey of breeding Skylarks randomly selected 1000 1-km squares from a stratification using land-use type. Those squares that also satisfied the constraints of the winter square selection procedure were selected to achieve coverage in both seasons and to reduce preparation time for volunteers, such as arranging access to private land. Accordingly, 421 squares from the summer survey were appropriately divided between the four strata for the winter survey plus 579 'new' random squares were selected to arrive at the sample of 1000 squares.

Volunteers were asked to make three visits, evenly spaced between mid-November 1997 and mid-February 1998. Ideally, visits were made on calm, dry days with good visibility, and were to avoid the first and last hours of daylight.

Bird and habitat recording were undertaken on a patch by patch basis within each square. A patch was defined as any area of a single habitat type of $>0.3\text{ha}$. In the majority of cases this meant a field, but in non-agricultural areas patches included, for example, woods, estuaries, moorland or saltmarsh.

On each visit, volunteers surveyed as many patches as possible, approaching all parts of each patch to within 150m. This distance was chosen as a suitable compromise between minimum flushing distances and the time taken to survey the whole square. However, based on the low densities recorded and the reported time taken to cover a square, probably few volunteers strictly adhered to this rule. Based on existing knowledge, patches of enclosed habitat that were clearly unsuitable for Skylarks, such as woodland or residential areas, were not visited.

Observers recorded the number of Skylarks seen in each patch on each visit; birds flying high overhead and not clearly associated with a patch were ignored. Instances where Skylarks were flushed from one patch to another were noted to reduce the risk of double counting. Patches that were not visited or received incomplete coverage were identified by the observer.

Observers classified the habitat of each patch using codes based on the Crick system with new codes specific to winter habitats. Set-aside was recorded as a stubble or grassland depending upon what it most resembled. To aid the identification of crops and stubbles, illustrated notes were provided to all volunteers and they were advised to consult the farmer on crop identity when arranging access permission. Weedy stubbles were defined as

fields with arable weeds and some crop volunteers whereas clean stubbles lacked green cover, possibly owing to post-harvest herbicide applications to eradicate problematic weeds such as Black Grass *Alopecurus myosuroides*.

For subsequent analyses, the agricultural habitat codes were combined to give 14 crop types or cultivation stages: cereals (barley, wheat, other cereals), oilseed rape, roots (sugar beet, fodder roots, potatoes, carrots), other crops, clean cereal stubble, weedy cereal stubble, 'unspecified' cereal stubble, oilseed rape stubble, root crop stubble, other crop stubble, bare till (ploughed, harrowed or drilled soil prior to germination), grazed grass, ungrazed grass, 'unspecified' agricultural grass.

Purpose of Data Capture

The survey was designed to quantify the availability and use of habitat by Skylarks in winter and to complement intensive winter studies carried out on individual farms.

Geographic Coverage

All of Britain. 1000 sample 1-km squares were selected by randomly selecting squares from a stratification based on land-use and habitat.

Temporal Coverage

The winter of 1997/98 (a pilot in 1996/97) with three visits to selected 1-km squares evenly spaced from mid-November 1997 to mid-February 1998.

Other Interested parties

The survey was funded as part of the partnership of the BTO and the Joint Nature Conservation Committee (on behalf of English Nature (now Natural England), Scottish Natural Heritage and the Countryside Council for Wales (now Natural Resources Wales), and also on behalf of the Environment and Heritage Service in Northern Ireland).

Organiser(s)

Simon Gillings

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Publications

The main report of the survey is:

Gillings, S. & Fuller, R.J. 2001. Habitat selection by Skylarks *Alauda arvensis* wintering in Britain in 1997/98. *Bird Study* 48: 293-307.

The survey was noticed in *BTO News* numbers 212 and 222.

Available from NBN?

No.

Computer data -- location

BTO Windows Network central area.

Computer data -- outline contents

MSAccess database and Excel spreadsheet containing the primary data, nearly 14000 lines of data (one per patch) in the 541 1-km squares surveyed; counts and habitat on each visit. 5 directories containing more details.

Computer data -- description of contents

The Excel spreadsheet has format:

Patch ID; 1-km square; patch number (within square); count on visit A, count on visit B; count on visit C; habitat on A; habitat on B; habitat on C; boundary type (1-4); field area (ha); completely in square (0 or 1).

The database has a table with all this and a facility for extracting the details for 1-km square.

The 5 directories are:

DATA: contains the data.

PILOT: contains files relating to the pilot survey.

SETUP: contains programs and datasets used to select the squares.

WATLASANAL: contains datasets and programs used to perform some analyses of Winter Atlas data used for a paper for the Skylark Workshop proceedings.

WSSANAL: contains datasets and programs used to analyse the data for the Bird Study paper.

Each directory contains a contents.wri file which explains the contents of each file.

Information held in BTO Archives

1 Transfer Case containing drafts of the report and some letters. All data that were input were disposed of as they contained no extra information than was input.

Notes on Access and Use

Other information needed

Notes on Survey Design

The winter range was defined as all 10-km squares where the 90th percentile of repeated *Winter Atlas* counts exceeded zero, leading to 64.3% of 2825 10-km squares in Britain. Square selection was further refined by removing all 1-km squares where 40% or more of the square was attributed to the 'urban/industrial' land cover component of the Institute of Terrestrial Ecology's (ITE) *Land Cover Map of Great Britain*. This removed densely built-up

areas as being unsuitable for Skylarks. The remaining 1-km squares were classified using four ITE landscape types: arable, pastoral, marginal upland and upland, although most upland squares had already been removed on the basis of being outside the Skylark's winter range. The remaining upland squares were removed because they supported extremely few Skylarks and because they were unlikely to be surveyed by volunteers in winter due to altitude, inaccessibility and severe weather.

Saltmarsh is a favoured habitat of Skylarks in winter and may support significant numbers. However, because of its restricted distribution, few saltmarsh squares were likely to be selected by simple random sampling. Squares were therefore redesignated for the purposes of this survey as 'landscape type = Saltmarsh' if 20% or more of the square was classified as 'saltmarsh/seaweed' in the ITE *Land Cover Map of Great Britain*. Using this definition the distribution of 'saltmarsh squares' broadly matched the distribution of saltmarsh given elsewhere. Based on the results of a pilot survey, 1000 1-km squares were selected in four strata: 685 arable, 91 pastoral, 31 marginal upland and 193 saltmarsh.

Specific Issues for Analysis

The counts of birds were underestimates of absolute abundance and cannot be used to produce population estimates.

The area of each habitat type within each sampled 1-km square was used to produce estimates of the total area in lowland Britain of the 14 agricultural habitats using a bootstrapping method. This was necessary because there are currently no quantitative estimates of the extent of each agricultural habitat in winter, especially cereal stubbles. Annual statistics of crop extent in June cannot be extrapolated to winter to give, for example, the area of stubble, due to the rapid turnover of habitat during the winter months. Similarly the Government's December census gives crop areas but no information on stubbles.

The return rate of random squares from each stratum did not differ significantly from the initial stratification indicating that there was no bias in coverage towards certain strata. The actual dates of the three visits made by observers were well spaced through the winter (median and quartiles): first visit = 6 December (23 November to 15 December), second visit = 14 January (4 January to 24 January) and third visit = 13 February (4 February to 17 February). Therefore the 'visit' was used as an approximation to season. However there was a period of wet and windy weather in early 1998, and some third visits were delayed to the end of February as a result. Also poor winter weather and short daylength meant that a small number of visits were undertaken in suboptimal weather conditions.

Habitat selection was analysed at both landscape and patch scales. At the landscape scale the general habitat composition of occupied and unoccupied 1-km squares was examined. In eight separate logistic regression analyses, the presence-absence of Skylarks in each square was related to the area of one of eight broad habitat types. A term for visit (early, mid- or late) was included in the model since data from all three visits were entered and occupancy potentially differed between visits. After ascertaining what determined square occupancy, it was planned to investigate what determined Skylark abundance in occupied squares using Poisson regression for count data but this failed because of overdispersion of Skylarks. At the patch scale within occupied squares resampling was used to determine whether habitat use differed from what one would expect given the availability of a habitat.

This was performed using data from each visit separately to detect differences in habitat selection through the winter. Habitat use was assessed for 15 habitat types: the 14 defined agricultural habitat types plus 'Other habitats' -- a catch-all class to include regularly occupied non-agricultural habitats (eg saltmarsh), rarely occupied habitats (eg semi-natural grassland) and some habitats that were never used (eg woodland).

Field size was investigated to test any preference for large over small fields. An increase in field occupancy might be expected with increasing field size as a flock landing at random is more likely to occur in a large than in a small field. Selection was investigated using a randomization procedure that produced the expected occupancy rate for fields of different sizes to compare with the observed rates of occupancy.