

Woodlark 2006

Title

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Description and Summary of Results

The Woodlark *Lullula arborea* is a rare breeding species and partial migrant in Britain, where it is mainly confined to southern England. It is a species of high to moderate conservation concern and subject to a national Biodiversity Action Plan (BAP).

In the UK, the Woodlark was widespread across much of southern Britain during the middle of 20th Century, probably peaking in the early 1950s. Subsequently, it underwent a dramatic decline in numbers and contraction in range to an estimate of 200-450 pairs for the time of the 1968-1972 Breeding Atlas. This was maintained at least until the first full national survey in 1986 which found that the population had declined to a minimum of 241 pairs, but it then increased once again. The 1988-1991 Breeding Atlas produced an estimate of 350 territories and the second full survey in 1997 showed a large increase to 1426-1552 pairs. Despite this the range declined over 50% between 1968-1972 and 1997 and resulted in the species being retained on the red list of the *Birds of Conservation Concern*.

There is little quantitative information on range prior to the 1960s. The 1968-1972 Breeding Atlas found it in 196 10-km squares, but by 1986 only 35 10-km squares were occupied. Subsequently it expanded to occupy 73 10-km squares in 1988-1991, and 90 in 1997. At this point the majority of birds were located within core areas of southern England and East Anglia (the latter accounting for 45% of the national population in 1997).

The greatest regional range contraction occurred in SW England, with occupied 10-km squares declining by 88% between 1968-1972 and 1997. Breeding in Cornwall ceased in the late 1980s, despite the Devon population showing a good recovery in numbers by 1997. Since the early 1990s there have been significant changes to core Woodlark habitat types, especially through several heathland restoration programmes across southern England, such as the RSPB Dorset Heathland Project and the Suffolk Sandlings Project.

A total of 3619 1-km squares were surveyed in 2006, in which 1757 territories were found, leading to a total population estimate of 3064 pairs (95% confidence limits 2472-3687 pairs). This represents an 88% increase over 1997 although over 70% of territories were located in just three regions: Dorset-New Forest-SW Hampshire, NE Hampshire-Surrey-Berkshire-West Sussex, and Breckland. There was also a range expansion of 46% especially into Wales and further north in England. It also showed that the BAP targets set in 1996 for population size and range expansion in England had been met, and that it was on schedule to meet the targets in Wales.

The located birds were associated with two main habitat types; heathland (66.7%) and forestry plantation (32.4%), and in the southwest many were on farmland. Sandy soils held the majority of territories (80.3%). The species has responded to heathland conservation restoration projects and is highly dependent on forest management.

The survey was restricted to areas known to have held Woodlarks in 1997 or subsequently, and to buffer zones around these, although it was quite widely publicised in an attempt to

attract any casual records. The various statistical techniques now available mean that the organisers are confident that the total numbers and overall range found encompasses the whole although clearly not every Woodlark territory in England in 2006 was recorded. This is particularly likely in those areas, such as SW England, where the population is thinly scattered, and also that the species can be difficult to census effectively when abundance is low, also a particular problem in the south-west.

Methods of Data Capture

The unit of survey coverage was the 1-km square. Many of the squares selected for survey were in 'Core areas'. These were either areas which had contained birds in the 1997 survey or subsequently, or were Special Protection Areas (SPAs) designated for breeding Woodlarks in parts of East Anglia, the New Forest area and Dorset. Other squares were in a stratified random sample of 1-km squares in 5km or 10km buffer zones (squares) around these 'core areas', with the chosen squares based on availability of suitable habitat and soil type (see Notes on Survey Design for more details). However, the survey was widely publicized in order to attract as many 'casual' records as possible, which in 2006 did include a number of records from outside the known breeding range.

A minimum of two visits was required to the designated area one within each of 15 February - 31 March and 1 April - 31 May, and ideally at least 3 weeks apart. Observers were asked to completely cover their square and walk to within 100m of all areas of suitable habitat. This is primarily heath and conifer plantations which had been recently clear-felled or were less than 7 years since planting, but included such as field margins and set-aside and other well-drained areas with short vegetation. Timing of visits was recommended to take place before midday on mild, clear, dry days with little wind. Every encounter with Woodlarks was recorded on a site map and these were analysed using GIS software to determine the number of territories present. Statistical methods were used to extrapolate from sampled squares in the buffer zones, and boot-strap resampling was used to calculate confidence limits on the figures obtained.

Following the visits the unit for the survey was the territory, defined as containing a singing male, a pair exhibiting breeding activity, individuals present on more than one visit, or two individuals being present.

Habitat type was recorded on a hierarchical scale for all bird registrations. The primary level was the predominant habitat of the 1-km square, chosen from the following categories: Farmland, Heathland, Plantation, Woodland, Human or Other. The secondary level related to the habitat types within the primary categories, as used in the 1997 survey, that occurred within a 50m radius of the first contact with each singing male.

Purpose of Data Capture

The stated aim was to provide an accurate assessment of the population and distribution of Woodlarks in Britain and how these had changed since the survey in 1997.

Geographic Coverage

All sites (1-km squares) where Woodlarks had bred within the previous ten years or so were surveyed, and a random selection in a buffer zone of 10km around known breeding sites. In practice the area covered was primarily East Anglia, the heaths of Surrey, Hampshire and Dorset and some areas of Nottinghamshire.

In SW England, Woodlarks breed almost entirely on farmland, so it was impossible to define suitable sites for coverage. All tetrads (2-km squares) in Devon that had ever held a breeding Woodlark were surveyed. For other counties where small numbers occurred or where there were historical breeding records, sites were visited on an *ad hoc* basis.

A total of 3619 1-km squares were surveyed, about two-thirds in core areas and one third in the sample within the buffer zones.

Temporal Coverage

The recording period was 15 February to 31 May 2006. A minimum of two visits was required, one within each of 15 February - 31 March and 1 April - 31 May, and ideally at least 3 weeks apart. (Note: previous surveys had variously been from early February to late August but the restriction in 2006 was designed to minimise the chance of double recording of pairs following change of breeding location between broods.)

Other Interested parties

This was a joint survey run by BTO in partnership with the Royal Society for the Protection of Birds and English Nature (now Natural England). It was funded by RSPB, English Nature and the Forestry Commission (England).

Organiser(s)

Greg Conway for BTO.

Current Staff Contact

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Publications

The main report of the survey is:

Conway, G., Wotton, S., Henderson, I., Eaton, M., Drewitt, A. & Spencer, J. 2009. The status of breeding Woodlark *Lullula arborea* in Britain in 2006. *Bird Study* 56: 310-325.

The survey was noticed in *BTO News* numbers 256, 261, 262 and 270.

Available from NBN?

Yes.

The dataset contains the geographical location of the centre of territories as determined by GIS from the results of the 1986, 1997 and 2006 surveys.

Computer data -- location

BTO Windows Network central space.

Computer data -- outline contents

3 data files contain precise central locations of all individual territories: actual_terr_points, approx_terr_points, possible_terr_points
There are also 2 summary files.

Computer data -- description of contents

Information held in BTO Archives

1 Archive Box containing all data sheets.

Notes on Access and Use

Full disclosure of breeding locations to the public might lead to environmental harm. Users are requested to exercise appropriate care when publicising or publishing any results.

Other information needed

Notes on Survey Design

First, information on the occupation of sites since 1997, including both those occupied in previous surveys or since 1997, was collated through BTO and RSPB staff and regional networks, and by contacting county bird recorders and regional Woodlark experts. Data were also extracted from birdwatching records submitted to the BTO/Birdwatch Ireland/RSPB BirdTrack website (www.birdtrack.net), the national BTO/RSPB/JNCC Breeding Bird Survey (BBS), and incidental records collected during the 2004 national European Nightjar *Caprimulgus europaeus* survey. (Nightjars share a similar habitat preference to Woodlarks across much of the Woodlark's known range.)

Secondly, squares containing lowland heath within a 5km and a 10km buffer around core squares were identified by Geographical Information Systems (GIS) maps from the Heathland Extent and Potential (HEaP) database, heathland inventories (held by RSPB and Natural England) and suitable areas of plantations derived from forest stock maps (databases of the Forestry Commission). These last targeted forestry plantations of ≤ 7 years old, or clear fell areas. Other potentially suitable habitat was identified from GIS layers of sandy, chalk and other free-draining soil types.

In addition, a stratified random sample of 1-km squares was selected and classed as either Suitable or Unsuitable, according to: 1) their proximity to core breeding locations (again within 5km and 10km buffers around core squares); 2) the presence of suitable soil types (ie

sand, chalky and free-draining; and 3) suitable habitat (heathland containing >5 ha of habitat per 1-km square).

Initially, a total of 2000 1-km squares was selected, divided between four strata. This approach was adopted, because there is a strong association of Woodlarks with readily identifiable habitats and/or soil types. The strata and respective sample sizes (with percentage cover relative to the squares available) are as follows: 1) suitable habitat within the 5km buffer ($n=1350$, 17.2%); 2) non-suitable habitat within the 5km buffer ($n=150$, 2.4%); 3) suitable habitat within the 10km buffer ($n=450$, 9.4%); and 4) non-suitable habitat within the 10km buffer ($n=50$, 0.5%). The sampling effort within the 5km buffer and 10km buffers was set at 75% and 25% respectively, as this is where the majority of range expansion was expected to occur, based on the previous national survey. Within both the 5km and 10km buffers, the sampling intensity was 90% in the squares with suitable habitat and 10% in those with non-suitable habitat. (It was deemed necessary to sample some non-suitable squares as small pockets of suitable habitat may not have been identified or types of land use, such as crop stubbles or set-aside, may provide breeding habitat.)

Further requests for casual records were publicized in the bird watching press and birding websites, including BirdTrack. Surveyors were also encouraged to visit other sites, either historically supporting Woodlarks or containing potentially suitable habitat. There were also 'extra' observer-selected squares, which contained potential habitat for Woodlarks but for which there was no recent (known) evidence of occupation.

Specific Issues for Analysis

The basic counting unit for the survey was a territory. Territories were defined as containing: 1) a singing male; 2) a pair exhibiting breeding activity (nest, mating, displaying, etc); 3) individuals present on more than one visit; and 4) two individuals present.

Records of individuals only seen in flight (except song flight) were excluded.

All registration data for males, pairs, juveniles or un-aged and un-sexed individuals, and their behaviour (eg singing or flying) were recorded on a site-map. The registrations from the site-map were then plotted on a GIS. For the purposes of consistency across all sites and elimination of double counting (on edges of neighbouring 1-km squares), individual territories were determined from the precise location of bird registrations, according to the interpretation of the field surveyor. Where this information was not available, the following criteria were applied: 1) where different individuals were identified, such as simultaneously singing males; 2) where singing males were over 400m apart, except where known topographical or structural features ('barriers' such as forest blocks) separated males; and 3) where clusters of registrations, from sequential visits, indicated the presence of distinct groupings that were indicative of discrete territories.

The overall population estimate was derived from three components: 1) the number of territories counted within the core squares; 2) estimates of the number of territories in the suitable habitat within each of the two strata (in 5km and 10km buffers around the core squares), derived by extrapolation from sampled squares; and 3) an upward correction for territories missed in squares surveyed fewer than four times. A boot-strap, re-sampling method was used, with 999 reiterations to calculate 95% confidence intervals for estimates of the latter two elements.

For analytical consistency with the 1997 survey, six population centres were adopted in 2006: 1) Devon and Cornwall (SW England); 2) Dorset, New Forest and SW Hampshire (Dors/NF/SW Hants); 3) NE Hampshire, West Sussex, Berkshire and Surrey (NE Hants/Surr/Berk/W Suss); 4) 'Breckland' (within East Anglia, a Special Protection Area (SPA) of heathland, forest and farmland straddling west Norfolk and Suffolk); 5) 'Suffolk Sandlings' (an area of heathland and forest in coastal east Suffolk); and 6) Nottinghamshire, Lincolnshire and Yorkshire (Notts/Lincs/Yorks). All other locations were combined as 'Other' (7); that is, Ashdown Forest, north Norfolk, Staffordshire and Wales.