

## Ringed Plover 2007

### Title

Breeding Plover Survey 2007 (Ringed Plover)

(Note: In the breeding season of 2007, the BTO ran a UK-wide survey covering both Little Ringed *Charadrius dubius* and Ringed Plovers *C. hiaticula*. The surveys were run together and both species were looked for in each site, but the sites selected for each species were independent. They are therefore considered as separate surveys as were previous "joint" surveys of the two species.)

### Description and Summary of Results

A 1973-74 survey estimated a minimum total of 5700 pairs of Ringed Plovers breeding in Great Britain, although coverage was poor in Scotland. However, in 1983-84, detailed survey work in the Western Isles, Shetland and Orkney revealed much larger numbers of the species than previously estimated, and the 1984 survey provided a United Kingdom population estimate of 8617 pairs (Great Britain holding 8483 pairs) about two-thirds of which bred in Scotland and over 25% in the Western Isles. The 1988-1991 Breeding Atlas indicated a small spread from the coast to inland sites, particularly in eastern and central England, since the earlier 1968-1972 atlas although no attempt was made to update the population estimate at that time.

Since 1984, there have been some local population declines of Ringed Plover, notably in the stronghold of the Western Isles where several wader species have suffered greatly from egg predation by introduced Hedgehogs *Erinaceus europaeus*. Although Ringed Plover nests in the Western Isles are not as vulnerable to Hedgehogs as those of other wader species, due to habitat preferences, there was nevertheless a substantial decline between the early 1980s and 2000 for reasons that are not clear. Breeding Ringed Plovers are very susceptible to human disturbance, especially on narrow beaches, and this can impact numbers locally. With apparently increasing recreational use of beaches, and proposals for improved coastal access in England and Wales, this factor could assume national conservation significance for the species.

The 2007 survey had three main aims: 1) to obtain an updated population estimate in the UK and its constituent countries; 2) to investigate the species' current distribution and habitat associations; 3) to census all those Sites of Special Scientific Interest (SSSIs) and Special Protection Areas (SPAs) designated for their importance for breeding Ringed Plovers.

For Ringed Plover, 67% of the 4169 Key Sites Tetrads and 63% of the 1515 Sample Tetrads were surveyed with these totals excluding counts received as supplementary records. This was (happily) unexpectedly high considering the remote nature of many of the Scottish sites and the limited number of available surveyors there. The best coverage (in percentage terms) was obtained for coastal areas, particularly in Northern Ireland, Wales and the Isle of

Man. Inland, good coverage was obtained for areas with a lot of freshwater, particularly in England. No Ringed Plovers were recorded in sample tetrads in inland Northern Ireland, Wales and the Isle of Man and thus no extrapolation was made in these cases. The highest absolute area covered was inland areas with low freshwater cover in England.

In total, 4232 pairs of Ringed Plovers were recorded during the survey, with 2656 (63%) in Scotland, 1184 (28%) in England, 214 (5.1%) in Wales, 62 (1.5%) in Northern Ireland and 116 (2.7%) in the Isle of Man. No pairs were recorded in the Channel Islands. This led to an estimated 5291 (95% confidence limits 5106-5478) pairs of Ringed Plovers in Great Britain with the United Kingdom (excluding the Isle of Man and Channel Islands) as a whole holding 5438 (5257-5622) pairs.

The core of the breeding distribution remains in Scotland, with 1008 pairs (24% of the total) being recorded in the Uists and Benbecula alone. Aside from machair, other important habitats were coastal shingle and coastal sand, these supporting (outside of the Uists and Benbecula) 39% and 14% of the pairs recorded.

These figures show a large decline since 1984. Declines are also apparent in a comparison of changes on individual sites surveyed in both years, with the largest decreases apparent at inland sites and in England and Scotland.

Of the six Special Protection Areas (SPAs) designated for breeding Ringed Plover, five (all four in Scotland and the North Norfolk Coast) held more than 1% (53 pairs) of the national population. The international importance threshold for the subspecies *hiaticula* (breeding in Iceland, the Baltic and south Scandinavia to Britain, Ireland and France) is 730 individuals, a figure only exceeded by the 375 pairs on the South Uist Machair and Lochs SPA.

The present population estimate for Ringed Plover in all of Ireland is 1250 pairs. As the estimated number of pairs breeding in Northern Ireland changed little between 1984 and 2007, there is at present no reason for this to be revised.

### **Methods of Data Capture**

The unit of survey was the tetrad and two kinds were sampled:

a) 'Key Site Tetrads' -- defined as the tetrads encompassing sites that were known, either from recent bird reports or the 1984 survey, to have been previously occupied by the species; and

b) 'Sample Tetrads' -- a stratified selection to provide estimates of the number away from the Key Sites.

Volunteer observers were requested to make two survey visits to each site, the first between 15 April and 14 May and the second from 15 May to 30 June.

An individual form was produced for each site with a map of the tetrad to be covered.

Observers were asked to record the numbers of adults and breeding pairs present on each visit (and plot registrations onto a map), and to estimate the total number of breeding pairs over the course of the visits and assign these to habitat classes. If not all the area was surveyed, observers were asked to map or estimate the percentage of the area which was covered.

All visits were made on mild, dry days with little wind, starting at least one hour after sunrise and finishing at least one hour before sunset.

The survey also aimed to ensure as complete coverage as possible of those SPAs and SSSIs designated for breeding Ringed Plover. Four such SPAs are in Scotland: the North Uist Machair and Islands (4876ha) and South Uist Machair and Lochs (5017ha) in the Western Isles, Sleibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast) (1939ha), and Papa Stour (569ha) in Shetland; and two are in England: the Colne Estuary and North Norfolk Coast. The Chesil & The Fleet, Dengie, Hamford Water and North Solent SSSIs were also surveyed. (In Scotland, a single visit was made to census each SPA between 23 May and 06 June 2007.)

For Tiree and Papa Stour a 1:7500 scale map of each tetrad was provided onto which the location of each bird, its sex if determined, and activity was plotted. For the Uists, birds were plotted on 1:10000 scale maps, and covered the SPAs and a substantial extra area of suitable breeding habitat (including Benbecula). Here, virtually the entire area of 'machair' was covered, together with areas of adjacent 'blackland' allowing comparisons with previously published surveys.

Observers were required to survey all areas of potentially suitable breeding habitat within the SPA boundary, defined as areas with bare or sparsely vegetated ground near water, on the coast or inland, and always with landowners' permission if off public rights of way. The censuses of the Scottish SPAs aimed to determine the number of breeding pairs of all wader species present on each site and, for the Uists and Benbecula, other areas were also surveyed.

### **Purpose of Data Capture**

The 2007 survey had three main aims: 1) to obtain an updated population estimate for the UK and its constituent countries; 2) to investigate the species' current distribution and habitat associations; and 3) to census all those Sites of Special Scientific Interest (SSSIs) and Special Protection Areas (SPAs) designated for their importance for breeding Ringed Plovers.

### **Geographic Coverage**

The survey covered tetrads in the constituent countries of the United Kingdom (England, Northern Ireland, Scotland, Wales), plus the Crown Dependencies of the Channel Islands and Isle of Man.

### **Temporal Coverage**

Volunteer observers were asked to make two survey visits to each site in 2007, first 15 April - 14 May; and second 15 May - 30 June. For the Scottish SPA survey, a single visit was requested 23 May - 06 June 2007.

### **Other Interested parties**

The Breeding Plover Survey was funded by Natural England, Scottish Natural Heritage, the

Countryside Council for Wales, the Environment & Heritage Service (Northern Ireland), Anglian Water and the D'Oyly Carte Charitable Trust. BTO funding came from the legacy-based fund Birds in Trust, and the Christmas and New Year Bird Count. Scottish Natural Heritage and the Royal Society for the Protection of Birds funded the professional fieldworkers doing the surveys in the Outer Hebrides.

### **Organiser(s)**

Greg Conway as BTO staff member

### **Current Staff Contact**

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### **Publications**

The main report of the survey is not yet published although the basis of what will become this is in a BTO Research Report:

Conway, G.J., Burton, N.H.K., Handschuh, M. & Austin, G.E. 2008. UK population estimates from the 2007 Breeding Little Ringed Plover and Ringed Plover surveys. *BTO Research Report* no.510.

The survey was noticed in *BTO News* numbers 259, 261, 267, 269, 275 and 280.

### **Available from NBN?**

No.

### **Computer data -- location**

BTO Archives area of the Windows network

### **Computer data -- outline contents**

An Excel spreadsheet containing bird counts and details of each tetrad surveyed

### **Computer data -- description of contents**

The columns of the spreadsheet are:

Tetrad - standard coding; Source – Core tetrad, Sample tetrad, part of Ringed Plover Survey; Amended\_sep08 - occasional note; Amended\_date - occasional note; Visits - 0, 1 or 2; RPpairs - no. of pairs found; RPother - no. of other birds found; AssumedCoverage - % of tetrad; CoveredYNA - Y(es), N(o), A(ssumed) - last usually as observer knew there was no suitable habitat; RPpairs - no. of pairs of Ringed Plover found; Problem - ?? (almost all are 0); Site\_name; Central\_GR; TenKm square; Region - 4-letter BTO region; County; CountryName; TenKM; Region\_for\_allocation - 4-letter BTO region; Transfer - occasional YES meaning

moved to another region; Transfer; Site\_Type; RegStatus - Noted as Vacant if no RR; Surveyor – Name; Out - ??; Returned - date of return of data to BTO; pc\_Tetrad\_Surveyed - % of tetrad actually surveyed;

Then a series of columns noting the number of pairs in each habitat type:

Reservoir; Riv\_shingle; Gravel\_Pit; Sand\_Pit; Chalk\_Pit; Coal\_Mine; Waste\_dump; Other\_Ind; Dem\_Dev\_Site; Lake\_Loch; Pool\_Scrape; C\_shingle; C\_Sand; Inland\_shingle\_gravel; Saltmarsh; Machair; Arable\_Farmland; Grazed\_Farmland; Moorland; Sewage\_Works; Coastal\_Rock\_moor\_grass; Coast\_moorland; Shattered\_rock\_shingle\_and\_machair\_well\_inland\_from\_coast; Cliffs\_saltmarsh; Cliff\_saltmarsh\_with\_shingle\_and\_exposed\_rock; Rocky\_gravel\_outcrop\_on\_coast; Coastal\_eroded\_peat\_with\_shingle\_patch; Grass\_gravel\_exposed\_rock; Coastal\_rock\_with\_saltmarsh; Coastal\_rock\_cliff; Coastal\_Heath; Marine\_grassland; Track\_Road; Dry\_heath\_upland; Moorland\_rocky\_cliff\_top\_dry\_heath; Rocky\_shore\_machair; Quarry; Airfield; Oysterbed; Rose\_nursery; HabUnknown;

Notes; LPCount - count of Little Ringed Plovers in tetrad; Alternative\_Name

### **Information held in BTO Archives**

BTO Archives: 4 Archive Boxes of data etc

### **Notes on Access and Use**

### **Other information needed**

### **Notes on Survey Design**

'Key Sites Tetrads' were defined as the tetrads encompassing sites that were known, either from recent bird reports or the 1984 surveys, to have been previously occupied by the species. Supplementary counts were also received, some from surveys of tetrads covered for Little Ringed Plover, and these counts were treated as Key Sites in subsequent analyses. The 1984 Ringed Plover survey only provided a minimum estimate of the overall population of the species in the country as there were no attempts to estimate the numbers of pairs away from the sites surveyed. In order to obtain more complete estimates (with confidence limits) of the total numbers of pairs of the species, the 2007 surveys also included data from Sample Tetrads in areas away from the Key Sites. Samples of tetrads were selected randomly from a species-specific stratification. Use of this aimed to minimise the confidence limits attached to the resulting population estimates while ensuring that a wide spectrum of habitats in the country was surveyed.

The initial stratification was based on the freshwater cover data, and an upland/lowland classification, derived from the Centre for Ecology and Hydrology (CEH) Land-class 2000 database, as well as coastal proximity and country or dependency (England, Wales, Scotland, Northern Ireland, the Isle of Man and Channel Islands). The CEH2000 data cover the whole of the United Kingdom at a 1-km resolution. The freshwater cover data from this dataset were imported into a Geographic Information System (GIS) project, summarised to a tetrad resolution, and reclassified according to percentage water cover into 'No Water', 'Low Water' (>0% but <=5%) and 'High Water' (>5%). The upland/lowland classification was based on the CEH land-class stratification, which classifies each 1-km square into one of 32

land-class types. Land-class descriptions were used to derive two classes of land characteristic for this survey: primarily upland and primarily lowland. For our tetrad stratification a tetrad was considered to be 'upland' if over 25% of it (two to four 1-km<sup>2</sup> units) was classified as upland land-class type, otherwise it was classified as 'lowland'. The majority of Ringed Plovers in the United Kingdom breed on the coast. Thus all tetrads that clipped the coast were classified as 'coastal' while those which did not were classified as 'inland'. The classifications were superimposed on tetrads to give a potential 72 strata for Ringed Plover for the purposes of targeting sampling effort. Key Site tetrads were excluded from the stratification for selection of the Sample Tetrads, and those Key Sites surveyed were also excluded from the subsequent extrapolation from the Sample Tetrads surveyed. In total, 1515 Sample Tetrads were selected from the stratification for Ringed Plover.

During subsequent analyses, strata were simplified. For Ringed Plover, there were no apparent differences between the densities on upland and lowland tetrads except those on the coast in Scotland. Thus, inland, these categories were combined (within countries). In Scotland, the coastal tetrads were divided into two regional strata – northwest Scotland (from Fort William round to John O'Groats including all islands) and southeast Scotland (the rest). Likewise, freshwater cover strata were only retained for inland areas.

For more details of the methods of surveying the species especially on SPAs can be found in: Reed and Fuller (1983, *Wader Study Group Bulletin* 39: 14-16), Fuller *et al.* (1986 *Biological Conservation* 37: 333-361) and Fuller and Jackson (1999 *Wader Study Group Bulletin* 90: 47-55).

### **Specific Issues for Analysis**

Allowance needed to be made for the number of visits made to each site. The mean number of pairs estimated to occur on a site was less for those only visited once than for those visited more often. This may have been because of the number of visits made or, alternatively, because observers felt the habitat was unsuitable and so didn't make a second visit. There were no differences between estimated numbers on sites visited twice and those visited three times or more.

To allow for possible under-recording on sites only visited once, a correction factor was thus used. This was calculated by comparing, for those Key Sites or Sample Tetrads visited twice, the numbers recorded on the first visit to the overall number of pairs estimated to occur on a site. As a result a correction factor of 1.37 was applied to Ringed Plover numbers for sites only visited once, but it was not applied to the counts on Scottish SPAs.

The population size was estimated using bootstrap techniques similar to those that have proven successful for estimating national and regional populations of waterbird species. With 999 repetitions, separate estimates were made of the total population size in each country or dependency. (Note, none were recorded on the Channel Islands.) Each of these overall estimates was obtained by summation of the total number of individuals recorded across all Key Sites and estimates for each stratum contributing to the country or dependency in question. The latter were derived for each stratum by taking a random sample with replacement from the survey data for the given stratum until the cumulative

land area equated to the total for the entire country or dependency assigned to that stratum outwith the surveyed Key Sites. (Note, assessment of the area covered by Sample Tetrads and Key Sites, and thus the cumulative land area outwith Key Sites for which estimates were required, took into account observers' estimates of the percentage area covered within each tetrad.) With each repetition, an overall estimate for Ringed Plover for Great Britain was obtained by summing the estimates for constituent parts. The population estimates calculated for Great Britain were used to calculate thresholds -- rounded 1% levels of the estimates -- so that sites of national importance for each species might be identified in future.