Ringing & Migration (2007) **23**, 217–222

Continental Great Spotted Woodpeckers in mainland Britain – fact or fiction?

JOHN COULSON[1]* and NIGEL ODIN[2]

[1]29 St Mary's Close, Shincliffe Village, Durham City DH1 2ND, UK [2]Landguard Bird Observatory, View Point Road, Felixstowe, Suffolk IP11 3TW, UK

The wing lengths of Great Spotted Woodpeckers *Dendrocopos major* resident in Britain (subspecies *anglicus*) are more variable than had previously been realised, with one individual in a thousand reaching extremes of 123 mm and 140 mm. As a result, many of the past British records claiming to be of the larger continental subspecies *major* have probably been misidentified. There is no reliable evidence to indicate that continental Great Spotted Woodpeckers visit Britain annually. Rather, infrequent irruptions into Britain occur about once in 12 years. Birds arriving at Fair Isle are at the top end of the size range of this species, and probably originate from northern Russia and Scandinavia. The birds irrupting into the mainland of Britain are intermediate in size but, on average, have longer wings than the British residents, and so only the larger individuals with wing lengths beyond the British range can be identified as of continental origin. Woodpeckers originating from continental areas south of the Baltic have similar wing lengths to British birds and cannot be identified from wing length measurements. Currently, there are only two instances of Great Spotted Woodpeckers being ringed on the European continent and recovered in Britain, again indicating that immigrant birds are probably few.

The Birds of the Western Palearctic (BWP) (Cramp 1985), the *Migration Atlas* (Smith 2002) and *Birds in England* (Brown & Grice 2005) all state or imply that Great Spotted Woodpeckers *Dendrocopos major* reared on the continent of Europe (subspecies *major*) occur annually in Britain. According to BWP, 'Small numbers of the northern subspecies *D.m. major* recorded more or less regularly south to Alps, western France, Britain, and Ireland. Significant irruptions into Britain in October 1949 and October 1962. Lesser numbers reach Britain and Ireland in other years'. The *Migration Atlas* states, 'There is now considerable evidence from the biometrics of birds captured at east-coast and Scottish bird observatories that *major* occurs in small numbers in Britain in most autumns', and then goes on to write, [Since 1974] 'small numbers of *major* have been identified each year but no big irruptions have been recorded'.

Neither of these statements is supported by evidence and how these conclusions were reached is not explained. The statements appear to be based, initially, on a few long-winged individuals captured on Fair Isle (Williamson 1963), the appearance of which coincided with the arrival of other migrant bird species from northern Scandinavia. The only two cases of Great Spotted Woodpeckers being ringed abroad and recovered in Britain have been reported recently (Clark *et al* 2004, 2007) and confirm movements from Norway to Shetland. The evidence of immigration into mainland Britain originates from individuals seen on the coastline and those captured by ringers are claimed to include some long-winged birds, but the precise criteria used have not usually been recorded (Odin 2006). BWP reports that a sample of 28 British birds (which belong to the subspecies *anglicus*) had a wing-length range of 126–134 mm, while *D.m. major* from Scandinavia and northern Russia measured 138–147 mm, based on only 27 specimens. As a result, it has been widely assumed in Britain that wing lengths of northern continental and British birds do not overlap (Baker 1993), and all birds measured can be attributed with confidence to either the British race or the larger, continental subspecies, and birds with wing lengths over 137 mm originated from the continent. However this is an erroneous distinction because in reality the range of wing length for British Great Spotted Woodpeckers is appreciably greater than that reported from a sample of 28 birds. Bill size has also been suggested as an aid to identification, but this character seems of little value in separating individuals of the subspecies, as is evident from the overlap in ranges of bill sizes given by Cramp (1985). Indeed, we agree with Winkler *et al* (1995) that the validity of the British subspecies *anglicus*, first described in 1900, is suspect, and British birds may only be part of a gradient (cline) in wing size in this species, which spreads progressively north to south throughout Europe (see also 'Geographical variation'

*Correspondence author
Email: JohnCoulson1@compuserve.com

under species account in Cramp 1985). Great Spotted Woodpeckers from France, Belgium and Germany are only slightly larger than British birds (and are included within another dubious subspecies, *D.m. pinetorum*), and their wing lengths overlap extensively with British birds, so individuals from these areas are unlikely to be separated from British birds by measurement. Biometric measures of other body parts of Great Spotted Woodpeckers show less geographical variation and therefore are not of value in identifying the origin of individuals.

This paper shows that in large samples of Great Spotted Woodpeckers captured and measured in Britain, wing length extends over a larger range than has been published, and overlaps with the measurements of *D.m. major*. As a result, it is highly likely that many of the individuals captured on the mainland of Britain, and previously attributed to the continental subspecies, were of British origin. Birds of continental origin occur in Britain during their infrequent eruptions, and it has yet to be reliably established that continental birds arrive in Britain in small numbers every year.

METHODS

Up to 2004, some 22,000 Great Spotted Woodpeckers have been ringed on the mainland of Britain and, in recent years, many of these have had their maximum-chord wing length (Svensson 1992) recorded. In all, the BTO have over 7,224 wing-length records on computer files of birds ringed up to the end of 2005, and these measurements have been used in this study. The sample includes birds from all counties or districts of England, Wales and the mainland of Scotland.

We examined the wing length of Great Spotted Woodpeckers captured for ringing on the mainland of Britain and supplied to us by the BTO. On average, birds captured before September in their first year of life had slightly shorter wings than older birds, probably because the wings in some individuals had not completed growth until August, and so these young birds have been excluded from all further analyses. Note, however, that this sample of young birds did not include any with a wing length over 139 mm. The remaining data were divided according to the sex at ringing, to examine whether there was a sex difference in wing length. As is shown in the Results, the average difference in wing length between the sexes is minute, and so the main analyses were carried out ignoring the sex, and including 188 cases where the sex had not been recorded. Only birds of the year measured before their first September of life and one bird with a reported wing length of less than 100 mm were excluded. Birds captured and measured on Fair Isle were considered separately. A few records included wing lengths recorded to 0.5 mm, *eg* 135.5 mm, and these were rounded down to the nearest whole mm before use in this study.

The nature of the wing length distribution of individuals has been investigated using arithmetic probability paper (Chartwell graph paper, type 5571, which can be ordered from most suppliers of office stationery). This 'graph' paper is extremely useful in examining distributions of biometric data, such as wing length, and more frequent use by ornithologists is recommended. The arithmetic probability paper visually tests the extent to which biometric data fit normal (bell-shaped) distributions, *ie* indicating that they come from a single population of birds. Before plotting, the frequency data (wing lengths in this case) are first converted to cumulative frequencies, *ie* the numbers of birds with a particular wing length or smaller. These are then expressed as a percentage of the total birds considered, so values from 0% to 100% are obtained from the field data.

These cumulative percentages are then plotted on the arithmetic probability graph paper. If the data set follows a normal distribution, then the plot of points of the percentage cumulative frequency against wing length forms a straight line (and the slope is proportional to the standard deviation). If the data are not normal, such as when a group of longer-winged woodpeckers from Scandinavia are included in the sample of birds captured in Britain, then the straight line deviates into a curve at its upper end. The point of inflection on the percentage scale indicates approximately the proportion of birds in the two categories. Note that the smallest and largest wing lengths cannot be plotted, as the scale does not reach 0% or 100% (because the tails of a normal distribution extend to infinity). As a result, it is advantageous to have large samples of measurements, as in this study. The data used involved measurements made by many observers, but few anomalies were found. We noticed more measurements than might be expected which ended in 0 or 5 mm units. This tendency to round off values slightly above 4 and 9 units, or to round down values slightly over 0 and 5 units, seems to be an unintentional bias by recorders. However, because we used cumulative frequencies, these errors corrected themselves by the time we considered measures ending in 1 or 6 mm units (*eg* 131 mm and 136 mm). It should be noted that these biases are evident in the wing-length frequency distributions of the Great Spotted Woodpecker data (Fig 1), but are not obvious on arithmetic probability plots (Fig 3), and so do not detract from conclusions based on this latter method. In passing, it should be noted that this recorder bias could be eliminated if wing lengths in general were recorded into size ranges, *eg* 134.0–134.9 mm and 135.0–135.9 mm, rather than as whole mm (*eg* 134 or 135 mm).

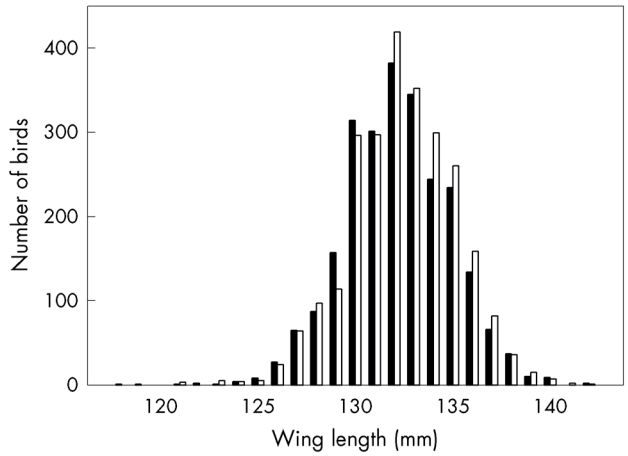

Figure 1. The frequency distribution of the wing length of 2,541 male (open bars) and 2,432 female (solid bars) Great Spotted Woodpeckers captured on mainland Britain. Note that for both sexes the distributions show similar, normal (bell-shaped) distributions, with the average for males being marginally greater.

The Fair Isle Bird Observatory has kindly made available wing-length measurements of 29 Great Spotted Woodpeckers captured on Fair Isle between 1953 and 2001, most of which were not on the BTO data base, and these have been analysed separately but plotted similarly.

In the analysis of the distribution of long-winged Great Spotted Woodpeckers, east-coast counties and regions are defined as those that have a coastline adjacent to the North Sea. These include Kent to Northumberland in England and the (former) east-coast regions of the Scottish mainland.

RESULTS

Sex difference in wing length

Initially, wing lengths of 2,432 females and 2,541 males captured and measured on mainland Britain were considered (Fig 1). The males had an average wing length of 131.8 mm (SD ± 3.01) and the females an average of 131.6 mm (SD ± 3.05) and while this difference of 0.2 mm in length is technically significant ($P < 0.05$), for practical purposes the difference in wing length between the sexes is so small that the data for the sexes have been combined.

Size of birds captured on mainland Britain

From the large sample of 5,161 birds, extremes of 120 mm and 143 mm were reported. Note the much smaller lower size limit found compared with 126 mm given in the small sample in BWP. These small birds must belong to *anglicus* because there are no smaller races than *anglicus* near Britain. Further examination of these data, expressed as cumulative percentage frequencies (Fig 2) and plotted on probability paper, shows that wing lengths of British-mainland Great Spotted Woodpeckers fit extremely closely to a normal distribution, *ie* give straight lines on the probability plot (Fig 3), except for a slight but progressive inflection starting at wing lengths of 138 mm and higher, indicating about five in every thousand birds were longer winged than expected. From the straight line of the points for the wing length range 122 to 138 mm on the probability plot, the chances of recording a British bird with a particular wing length can be read off and examples of the extreme probabilities are given in Table 1. In a sample of 1,000 British birds, it could be expected that the shortest wing would be about 124 mm and the longest 140 mm. This range is much greater than that recorded in BWP for British birds. If only one in a thousand British birds had a wing length of 140 mm or larger, then it would be expected that there would have been 5 or 6 birds in the sample of 5,161 measurements used in this study. Yet the sample contained 34 birds with a wing length of 140 mm or greater in this size category (a highly significant excess; $\chi^2_1 = 10.3$, $P < 0.002$), suggesting that about 29 birds could have come from another area which had larger birds than those found in Britain, but also note that about five of these large birds were likely to belong to the British population. It is unlikely that the 29 'extra' birds originated from northern Russia or northern Scandinavia, since about 10% of such birds would have been expected to have wing lengths exceeding 142 mm, but only two woodpeckers with a wing of 143 mm were in the sample of records from mainland Britain (except from Fair Isle; see below) and none were larger. Some long-winged birds may exist among the 22,000 Great Spotted Woodpeckers trapped in Britain, but these have not been reported for inclusion in the BTO database.

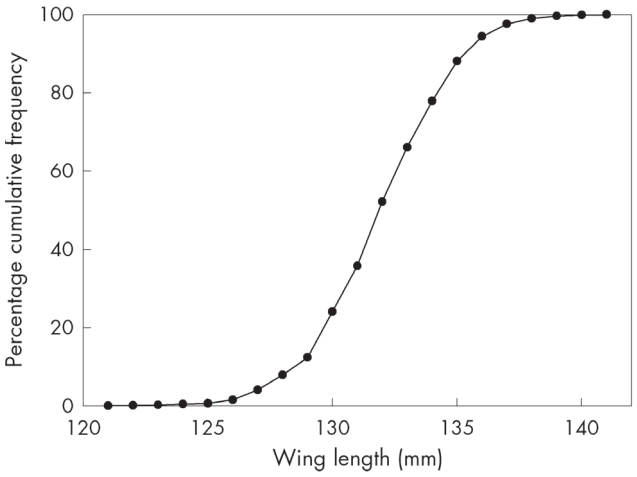

Figure 2. Data for wing length of male Great Spotted Woodpeckers (as in Figure 1) plotted as a percentage cumulative frequency

Table 1. The estimated frequencies of short or long wings in British Great Spotted Woodpeckers.

<124 mm	<126 mm	<132 mm	>135 mm	>137 mm	>139 mm	>140 mm
1 in 1,000	8 in 1,000	1 in 3	6 in 100	1 in 100	1 in 1,000	3 in 10,000

Size of birds captured on Fair Isle

Since 1945, 29 Great Spotted Woodpeckers have been captured on Fair Isle and had their wing lengths recorded. These had a mean wing length of 139.9 mm (SD ± 3.2), and which is significantly larger than the mean for British mainland birds ($P < 0.001$) by 7.7 mm (Fig 3). Even more importantly, 17% of the Fair Isle birds had a wing length of 142 mm or larger, and 10% 143 mm or larger, and wing lengths up to 147 mm were recorded in this small Fair Isle sample. If birds of this size were involved in the woodpeckers captured on the mainland of Britain, one in every six of such birds would have wing lengths of 143 mm or larger, but only two individuals (at 143 mm) have been captured. Three birds out of 29 captured on Fair Isle had wings longer than 143 mm. The obvious conclusion from this analysis is that the large woodpeckers visiting Fair Isle come from the area where the largest Great Spotted Woodpeckers breed, that is from northern Russia and Scandinavia, as suggested by Williamson (1963). Movement between Scandinavia and Shetland has now been confirmed by two recent ringing recoveries (Clark *et al* 2004, 2007). On the other hand, the lack of even one bird with a wing length of over 143 mm on the mainland of Britain indicates that such northern birds have rarely, if ever, reached mainland Britain.

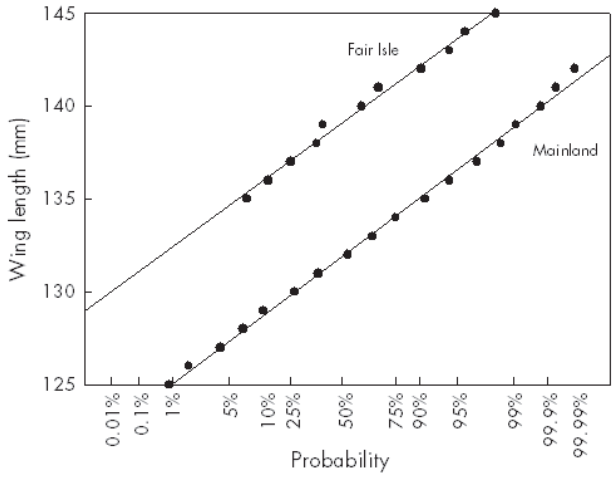

Figure 3. The cumulative percentage frequency of wing length of Great Spotted Woodpeckers captured in mainland Britain plotted on an arithmetic probability scale. Note the deviation from a straight line, starting at 138 mm and larger. A similar plot is presented based on 29 birds captured on Fair Isle, showing that these birds tended to be appreciably larger, but also follow a normal distribution.

Characteristics of woodpeckers captured in mainland Britain with long wing lengths

There were 34 Woodpeckers captured in Britain with wing lengths over 139 mm and when these are subdivided in relation to month, year and location of capture (Tables 2 & 3), a greater insight into their occurrence and distribution in Britain becomes obvious, because their captures are not distributed randomly by area, year and month. A high proportion (59%), far more than would have been expected by chance, were captured in east-coast counties and, of these, 80% (16/20) were in September or October (Table 2). Considering years since 1994, 63% (12 of 19) of the east-coast captures were in 2001 (Table 3), but these restricted occurrences were not repeated from birds captured in more western mainland sites. Further, four of the six birds with extreme wing lengths of 142 or 143 mm were captured in 2001. Clearly, the pattern of records of long-winged birds in east-coast sites was not repeated at more western sites. While a majority of the long-winged birds in eastern counties and regions were captured on the coast, such as at observatories, several were found in wooded areas many kilometres inland. Presumably some of the immigrants penetrated inland into wooded areas.

There is a clear tendency for birds with long wings (> 138 mm) to occur in eastern counties (Table 4), and that tendency increased appreciably when longer wing lengths are considered. This is what would be expected from an irruption arriving on the east coast, but with few birds penetrating to more western regions. At 138 mm, the great majority of birds that had been captured were probably of British origin, whereas at 140–141 mm most, but not all birds were probably from the continent. Only those with wings of 142–143 mm (or any larger captured in the future) can be attributed with an appreciable degree of confidence to a continental origin.

DISCUSSION

Because the range in size of British Great Spotted Woodpeckers is greater than previously considered, the previously held conviction that long-winged woodpeckers of this species, probably originating from Scandinavia and Russia, reach the mainland of Britain every year (Cramp 1985, Smith 2002) is not confirmed. Birds with a wing length over 138 mm could be of the nominate race, but as British birds can reach up to 141 mm, it is realistic to assign only birds of 142 mm and over

Table 2. Month of capture of Great Spotted Woodpeckers with wing length of over 139 mm subdivided between Fair Isle, east-coast counties (and regions) and elsewhere in Britain. Fair Isle records are also given for birds with wings < 140 mm.

	Jan	Feb	Mar	Apr	May	Jun	Jly	Aug	Sep	Oct	Nov	Dec	Total
East coast	0	0	0	0	2	0	0	0	11	5	1	1	20
Elsewhere	2	1	3	0	1	2	1	1	2	0	0	1	14
Fair Isle >139 mm	0	0	1	1	2	0	0	1	9	4	0	0	18
Fair Isle <140 mm	0	0	0	0	0	0	0	3	5	3	0	0	11

Table 3. Number of captures by year of Great Spotted Woodpeckers with wing length over 139 mm in east coast counties, on Fair Isle and elsewhere, 1995–2005.

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
East coast	1		1		2	1	12		1	1		19
Elsewhere		1			1	1	2		3	2	3	13
Fair Isle			1				1					2

to the nominate race. Records of several long-winged birds at different localities but in the same time period, as occurred in 2001, strengthen the evidence for the arrival and presence of the nominate race.

The arrival of long-winged continental woodpeckers in Britain is only or mainly restricted to infrequent irruptions. Since 1945, our search of the literature and evidence based on wing length indicate irruptions into Britain only in 1949, 1962, 1968, 1990 and 2001, that is about once in every 12 years, and most of these were only evident on or near restricted parts of the east coast of Britain. Brown & Grice (2005) also record notable irruptions in 1901 and 1929, but do not give details or the source of the information. There may have been one or two other years with minor irruptions, but the evidence for these is neither strong nor compelling. This low frequency of irruptions entering Britain contrasts with irruptions in 12 out of 25 years in Finland (Hildén 1974).

Small numbers of very long-winged Great Spotted Woodpeckers reach Fair Isle from time to time, but such long-winged birds have been not recorded from the mainland of Britain, so either birds involved in these irruptions do not reach mainland Britain in numbers or, less likely, their occurrence there is so brief that they are unlikely to be captured for ringing. The birds irrupting into Fair Isle are large and at the upper size range recorded for the *major* subspecies. Williamson (1963) was probably correct in suggesting that these birds have departed from northern Scandinavia, Finland or, perhaps, northern Russia. This extreme northern population is unlikely to be the origin of Great Spotted Woodpeckers that occasionally irrupt into mainland Britain. The immigrants are intermediate in size, presumably originating from areas south of the birds that visit Fair Isle, perhaps from southern Scandinavia and countries bordering or immediately south of the Baltic. It is possible that Great Spotted Woodpeckers from central Germany, the Netherlands, Belgium and France occasionally irrupt into Britain (subspecies *pinetorum*), but these birds are too similar in size to the British birds to be identified from wing-length records. Their presence can only be confirmed either from recoveries in Britain of woodpeckers ringed abroad, or by new chemical techniques (see p 11 in Marchant 2002) which can confirm the place of origin of individuals. So far, no continental-ringed Great Spotted Woodpecker has been reported from the mainland of Britain and only one bird ringed in Britain has been recovered abroad (in Belgium). This record is of little value in the context of this study since it was already fully grown when ringed, and it is not known if it was reared in Britain or was a continental bird that subsequently returned there. However it was ringed on the coast in SE England in September 1962, which was one of the few years that other evidence indicated that birds probably irrupted into Britain.

Table 4. Area of capture of Great Spotted Woodpeckers with long wings separated into east-coast counties (see definition in Methods) and remaining countries or districts, but excluding Fair Isle records. Note the significant increase in birds captured in the east-coast counties as the wing length considered increases.

	Number in east-coast counties	Number in other counties	Total	Percentage of total in east-coast counties
Random sample	24	76	100	24%
Wing 138 mm	23	62	85	27%
Wing 139 mm	14	15	29	48%
Wing 140 mm	13	11	24	54%
Wing 141–143 mm	7	3	10	70%

There is a need for a detailed study of the trends in size (and plumage) of the Great Spotted Woodpecker throughout Europe; existing data (*eg* Cramp 1985) tend not to be locality specific and are referred to in general terms, such as 'Scandinavia and Finland', 'western Siberia' and 'north European USSR'.

In many years, coastal movements of Great Spotted Woodpeckers are reported from the continental coastline of the North Sea, but, apparently, these birds do not usually cross the North Sea because there are few simultaneous records on the east coast of Britain. So apart from occasional irruptions, what are the origins of the relatively few woodpeckers seen along the east coast? Too few have been measured to identify the area of origin, but they have been often assumed to be birds arriving from the continent. The possibility that many of these Great Spotted Woodpeckers are of British origin, and are making coastal movements, comparable to those recorded from the continental coast (Cramp 1985), has not been excluded. An increasing breeding density of Great Spotted Woodpeckers has been recorded in Britain in recent years by the BTO's Common Birds Census and Breeding Bird Survey (Baillie *et al* 2007). At Landguard Bird Observatory, Suffolk, no Great Spotted Woodpeckers were recorded from 1973 to 1983, followed by annual bird–day totals in single figures from 1984 to 1999 (unpublished observatory data). Since then, a spectacular increase has occurred, peaking at a total of 30 bird–days in 2005. This increase in coastal sightings has also occurred across the whole of the Suffolk coastline (p 117 in Wright 2005). Thus the increase in woodpeckers reported at coastal migration sites in years other than 2001 could plausibly be linked to dispersal of young British birds associated with the high breeding density currently in mainland Britain. The origin of these birds still requires further investigation.

Not all woodpeckers captured in Britain with wing lengths over 139 mm are necessarily of foreign origin. Some of these are British birds at the upper end of the normal distribution, but it is not possible to decide which are which. Those recorded inland and on the western side of the country are particularly problematical. They do not show a seasonal or year-to-year pattern of occurrence as on the east coast. No long-winged birds were reported in western Britain following the east-coast immigration in 2001, nor were any long-winged birds captured anywhere in Britain in 2002, the year after the influx (Tables 2 & 3). Perhaps few immigrants penetrate to western Britain, but it remains to be established whether any immigrants remain in Britain during the ensuing winter or stay even longer and breed here.

ACKNOWLEDGEMENTS

The authors are grateful to the many ringers who have captured and measured wing lengths of Great Spotted Woodpeckers over the years and who have strived in vain to recapture an individual ringed on the continent. This analysis would not have been possible without the insight of the BTO to collect and form computer files of biometrics of birds captured for ringing and we are grateful for the data that have been willingly supplied. Our gratitude also extends to Deryk Shaw of Fair Isle Bird Observatory for making available details of the 29 Great Spotted Woodpeckers captured and measured there over more than 50 years. We thank two anonymous referees for constructive comments.

REFERENCES

Baillie, S.R., Marchant, J.H., Crick, H.Q.P., Noble, D.G., Balmer, D.E., Barimore, C., Coombes, R.H., Downie, I.S., Freeman, S.N., Joys, A.C., Leech, D.I., Raven, M.J., Robinson, R.A. & Thewlis, R.M. (2007) *Breeding Birds in the Wider Countryside: their conservation status 2006*. Research Report 470. BTO, Thetford. (www.bto.org/birdtrends)

Baker, K. (1993) *Identification Guide to European Non-passerines*. BTO, Thetford.

Brown, A. & Grice, P. (2005) *Birds in England*. T. & A.D. Poyser, London.

Clark, J.A., Robinson, R.A., Balmer, D.E., Adams, S.Y., Collier, M.P., Grantham, M.J., Blackburn, J.R., & Griffin, B.M. (2004) Bird ringing in Britain and Ireland in 2003. *Ringing & Migration* **22**, 85–127.

Clark, J.A., Robinson, R.A., Adams, S.Y., Grantham, M.J., Risely, K., Balmer, D.E., Blackburn, J.R., Griffin, B.M., Marchant, J.H. & Kimmel, V. (2007) Bird ringing in Britain and Ireland in 2005. *Ringing & Migration* **23**, 156–192.

Cramp, S. (1985) *The Birds of the Western Palearctic*. Volume IV. OUP, Oxford.

Hildén, O. (1974) Finnish bird stations; their activities and aims. *Ornis Fennica* **51**, 10–35.

Marchant, J.H. (2002) Learning about bird movements: methods of study. In Wernham, C.V., Toms, M.P., Marchant, J.H., Clark, J.A., Siriwardena, G.M. & Baillie,S.R. (eds), *Migration Atlas: movements of the birds of Britain and Ireland*, 1–13. T & A.D. Poyser, London.

Odin, N. (2006) Racial determination of Great Spotted Woodpeckers *Dendrocopos major* in Britain. *Ringers' Bulletin* **11**,106.

Smith, K.W. (2002) Great Spotted Woodpecker *Dendrocopos major*. In Wernham, C.V., Toms, M.P., Marchant, J.H, Clark, J.A., Siriwardena, G.M. & Baillie,S.R. (eds), *Migration Atlas: movements of the birds of Britain and Ireland*, 453–454. T & A.D. Poyser, London.

Svensson, L. (1992) *Identification Guide to European Passerines*. Lars Svensson. Stockholm.

Williamson, K. (1963) Aspects of autumn movements at the Bird Observatories. *Bird Migration* **2**, 224–251.

Winkler, H., Christie, D.A. & Nurney, D. (1995) *Woodpeckers*. Pica Press, East Sussex.

Wright, M. (ed) (2005) The 2004 Suffolk Bird Report. *Suffolk Birds* **54**, 38–168

(MS received 9 December 2006; accepted 4 February 2007)