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SHORT NOTE

Validity of ageing Wrens *Troglodytes troglodytes* on fourth primary spots

ROBIN M. WARD[1]* and CHRIS DU FEU[2]
[1]*Species & Populations, Wildfowl & Wetlands Trust, Slimbridge, Glos GL2 7BT, UK*
[2]*66 High Street, Beckingham, Nottinghamshire DN10 4PF, UK*

Hawthorn (1971) described a criterion for ageing many Wrens *Troglodytes troglodytes* based on the number of light 'spots' (bars) on the outer web of the fourth primary (as counted from the outside). When this criterion based on British Wrens was later applied to 38 Swedish skins, Svensson (1992) had difficulties with the technique. This arose from a large degree of overlap in the number of spots on the fourth primary of juvenile and adult birds, and the fact that the definition of the spots was sometimes difficult to discern. Similar difficulties were reported from Ottenby Bird Observatory, Sweden (Svensson 1992), and from Switzerland (Jenni & Winkler 1994, whose results concur closely with Svensson 1992).

In recent years, it is the experience of the authors that, amongst UK ringers, many use the fourth primary spot criterion for ageing Wrens whilst others are trained to dismiss its validity. The retention of juvenile coverts enables the ageing of the majority of individuals (Svensson 1992, Jenni & Winkler 1994) particularly during autumn and the early part of winter. When uncertainty exists, is undue significance given by some ringers to the fourth primary spot criterion for definite ageing? Given that the correct ageing of birds by ringers underpins Integrated Population Monitoring to which the UK ringing scheme contributes, this paper examines the reliability of using the fourth primary spot criterion for a Wren population in the English Midlands.

The number of 'spots' (bars) on the outer web of the fourth primary of Wrens was recorded from 1983 to 2003 for birds caught during the regular mist-netting of passerines in Treswell Wood, Nottinghamshire, England (53°18'N 00°51'W). The spots can vary from straw coloured to a pale brown, with the outer web otherwise coloured dark to blackish brown. Only those spots visible on the open wing were counted, *ie* excluding those hidden under the primary coverts. Most, if not all birds were aged and sexed using the criteria described by Svensson (1992). Amongst the biometrics recorded for most birds was wing length (maximum flattened chord to nearest 1 mm; Svensson 1992). Unless otherwise specified, the sample of birds used for this analysis were those originally ringed either as pulli or as juveniles that had retained 10% or more of the juvenile feathers that would normally be moulted at the post-juvenile moult, *ie* EURING code '3J' (Redfern & Clark 2001). This minimises the possibility of incorrect ageing resulting from (a) human error in discerning moult limits in difficult cases (Jenni & Winkler 1994), or if used (b) a count of the fourth primary spots which would, in any case, invalidate this analysis. Furthermore, counts of spots on the fourth primary have been discarded from the analysis if recorded within the time period that the fourth primary is normally moulted on adults (August–October; Ginn & Melville 1983, C du Feu unpublished). The moult data required to assign the fourth primary to the first or subsequent primary generation were not recorded.

A highly significant difference was found in the number of spots counted on the fourth primary of juvenile Wrens compared to adult birds (Mann–Whitney U test, $W_{61,19} = 2003$, n = 62 juveniles & 20 adults, $P < 0.001$). Furthermore, a difference was also found to be significant for a subset of the sample that contained matched pairs, *ie* data for individuals scored when juvenile and when later recaptured as adults (Wilcoxon Signed Rank test, Wilcoxon test statistic = 38.0, n = 8, $P < 0.05$). Table 1 shows that only birds exhibiting nine spots on the fourth primary existed in both age categories in the sample. Therefore, amongst the Wren population frequenting Treswell Wood, 60% of juveniles and 80% of adults could be correctly aged from the count of spots on the fourth primary, *ie* birds exhibiting eight or fewer spots were juvenile and those with 10 or more spots were adults.

From the sample of 82 birds, eight juveniles and one adult captured twice or more within the same primary-feather generation had, between captures, 'lost' one spot on the fourth primary. In all cases this was over an intervening capture period of two or more months, the final capture being in April or June for all but two birds; for these it was in November and December respectively.

*Correspondence author
Email: robin.ward@wwt.org.uk

Table 1. The frequency, expressed as a percentage, of the numbers of fourth primary spots amongst the two age categories: juvenile and adult birds.

No. of 4th primary spots	Juvenile	Adult
7	8	0
8	52	0
9	40	20
10	0	45
11	0	25
12	0	10

N = 62 in juvenile and 20 in adults

Table 2. The frequency distribution of the numbers of fourth primary spots amongst the two age categories, juvenile and adult birds, of each sex.

	Juvenile		Adult	
No. of 4th primary spots	Male	Female	Male	Female
7	2	8	0	0
8	51	30	0	0
9	13	9	3	7
10	0	0	23	17
11	0	0	15	8
12	0	0	2	2
Sample size	66	47	43	34

A reduction in spot numbers would be expected as a consequence of primary tip abrasion during the course of a year (Svensson 1992). Indeed a measured reduction of 1 mm was found in four of the nine birds mentioned above. Of the remaining 24 juveniles and two adults captured twice or more within the same primary generation, no change in spot numbers was recorded for both adults and 15 juveniles. However a further nine juveniles, all with initial captures in either July or August, had 'gained' one (eight birds) or two spots (one bird) on the final recapture, the difference perhaps a result of incomplete primary or primary covert growth on the initial capture, or human error in recording.

In most bird species, natal dispersal is more extensive among females (Greenwood & Harvey 1982). The Wren population of Treswell Wood is no exception, with, among those birds recaptured and sexed of the sample of 82 birds as used above, only 21% and 7% of the juvenile and adult Wrens (n = 38 and 14 respectively) being females; all were originally ringed as juveniles or pulli at Treswell Wood (see above). The birds were sexed during the breeding season by the presence of a cloacal protuberance (males) or brood patch (females) (Svensson 1992). The difference found in the number of spots counted on the fourth primary of juvenile Wrens compared to adult birds may therefore be significant for males but not necessarily comparable within females given the heavy bias in the sample used towards males. The evidence does not support this concern, however, as data from all birds irrespective of when they were originally ringed (n = 190) shows no evidence of sexual differentiation within an age class in the frequency distribution range of the number of spots on the fourth primary (Table 2).

It would be reasonable to expect a correlation between wing length and the number of spots on the fourth primary. However this was not substantiated by the present study with, for example, an insignificant weak correlation found amongst the adults (Spearman's rank-order correlation $r_s = 0.393$, n = 20, $P > 0.05$,), despite there being a significant difference in wing length between the age groups (two-way ANOVA, F = 12.12, $P < 0.01$, n = 182) and sexes (two-way ANOVA, F = 112.46, $P < 0.001$, n = 182); insufficient data were available to explore any relationship between sex and the number of fourth primary spots. A lack of strong correlation between wing length and the number of spots is, however, consistent with the variable spacing and length of the spots that exists along the fourth primary. Furthermore, qualitative observations show that the spots on juveniles and adults are of different types. In juveniles they are wider and more widely spaced than in adults. This means that longer wings may not be required in order to have more spots. Although wings tend to lengthen with age, this could explain why the correlation between the number of spots and wing length is only weak. The number of spots on the fourth primary is suggested not to continue to increase with age in adulthood. The two adults with second generation adult fourth primaries both exhibited 10 spots whereas the remainder of adults, all with their first generation of primaries, had between nine and 12 spots. Though wing length was found to differ significantly in respect to age and sex from a statistical standpoint, the differences are not of any practical importance due to very similar ranges.

Difficulties have been reported in using the number of spots on the fourth primary of Wrens for the subspecies *T t troglodytes* (Svensson 1992, Jenni & Winkler 1994), inferred from the location of the specimens examined, where only *T t troglodytes* exists (Snow & Perrins 1998). The subspecies to which individuals from the present study are most related is unknown since Treswell Wood lies within the clinal zone between *T t indigenus* in northern England and *T t troglodytes* in southern England (Snow & Perrins 1998). Situated in southern England, the Hawthorn (1971) study would however suggest that subspecies

variation is not the cause of any real variation in the validity of ageing Wrens on the fourth primary spot criterion, since it is likely that the Wrens in this study will have included *T t troglodytes*. On the British mainland at least, we recommend that birds carrying eight or fewer spots on the fourth primary can be aged as juveniles or first-years, and those with 10 or more can be aged as adults.

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