



SHORT REPORT

## Separation of Marsh Tit *Poecile palustris* from Willow Tit *Poecile montana* using a bill criterion

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Marsh Tits *Poecile palustris* and Willow Tits *Poecile montana* are difficult to separate on visual appearance, with a large degree of overlap of identification features (Perrins 1979, Scott 1999). This problem is particularly acute in the British races, *P. p. dresseri* and *P. m. kleinschmidti*, with birds in juvenile plumage considered to be essentially inseparable (Perrins 1979). Both the Marsh Tit and Willow Tit are on the 'Red List' of birds of serious conservation concern due to the significant decline in the British population of both species since the 1970s (Baillie *et al* 2007). Similar declines have been detected elsewhere in Europe, although the cause or causes remain unknown (BirdLife International 2004, PECBMS 2007). The evidence from Britain is that the decline of the Willow Tit has been more severe than that of the Marsh Tit (Baillie *et al* 2007), and differing factors may be at work (Siriwardena 2004, 2006). It is therefore imperative that these two similar species are reliably identified, in order for the changing populations and distributions to be monitored.

Perrins (1979) listed six 'main differences in plumage' to separate the Marsh Tit and the Willow Tit, these being: crown colour and gloss, presence/absence of a pale wing panel, bib size and definition, cap length, cheek patch size, and flank colour, but added the caveat that none of these differences was completely reliable. The one 'fairly reliable' method of separation suggested by Perrins (1979) was the relative lengths of outer and inner tail feathers (see du Feu & du Feu 1996), with Marsh Tit having outer tail feathers some 2–4 mm shorter than the inner ones, and this difference being 5–6 mm in Willow Tit. Scott (1999) tested all of these criteria on a known sample of both species in the hand, after the post-juvenile moult, and found only the tail method to be statistically significant, although there was an overlap in measurements involving some 36% of birds examined. Furthermore, abrasion of the rectrices can be evident by autumn, and may be severe (Svensson 1992, King & Muddeman 1995), thus undermining the use of this character. Another criterion for separating the two species, not mentioned by Perrins (1979) or Scott (1999), was proposed by Dewolf (1987): Marsh Tits show a narrow

pale margin on the cutting edge of the mandibles, forming a pale spot on the proximal part of the upper mandible, which is lacking on the wholly dark bills of Willow Tits. This criterion remains unconfirmed, however, and requires validating on large samples across the range of both species (Svensson 1992). This short report describes how we tested the reliability of Dewolf's (1987) proposed bill character for separating Marsh Tits and Willow Tits of several European races in the hand.

During 2005–07, Marsh Tits in Monks Wood National Nature Reserve (Cambridgeshire, eastern England, 52°24'N 0°14'W) were examined for the presence of pale cutting edges on the bill and pale markings on the upper mandible. Birds displaying pale marks were given a score of '1', those lacking marks were given a score of '0'. A total of 199 Marsh Tits were examined over 303 handlings in all months, including 62 birds in juvenile plumage, 116 as first-years after the post-juvenile moult, and 125 birds in adult plumage. Birds were sexed as 110 males and 89 females, using King & Muddeman's (1995) wing-length method. No Willow Tits were present in Monks Wood, so visits were made to known sites and requests were made for experienced ringers to examine and score the bills of Willow Tits in their study areas during the autumn/winter of 2007/08. Twenty-seven Willow Tits were examined, in Lincolnshire (Market Rasen area: 53°21'N 0°14'W; three birds), Derbyshire (Williamthorpe: 53°11'N 1°21'W; 16 birds) and Yorkshire (Potteric Carr: 53°30'N 1°6'W, Fairburn Ings: 53°44'N 1°19'W and Allerthorpe: 53°55'N 0°48'W; eight birds). Willow Tits could not be sexed (Svensson 1992) but were aged according to rectrix shape where possible (Laaksonen & Lehtikoinen 1976), and included six adults, six first-years and 15 birds of indeterminate age.

The bills of skins held at the British Natural History Museum, Tring, were examined in order to test the potential to increase sample sizes and also expand the geographical range to include additional races. To assess the effect of possible changes to the appearance of the bill after preservation and over time, which would invalidate their inclusion, the bills of 30 Marsh Tit and 52 Willow Tit skins from England were initially examined and compared

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with live birds. The appearance of the bills of skins tallied remarkably well with those of live birds, with the presence or absence of pale marks being clearly discernible; no significant post-mortem changes were apparent. A further 60 Willow Tit skins were subsequently examined, 30 from Scandinavia (Sweden, Norway, Lapland: *P. m. borealis*) and 30 from Switzerland and Austria (*P. m. montana*), and a further 27 Marsh Tits from Poland, Sweden and Norway (*P. p. palustris*). Skins were sexed according to their labels where possible, and aged as first-years or adults using the appearance of the rectrices. The Willow Tit skins included 46 males, 42 females and 24 birds of indeterminate sex, with 65 first-years and 47 adults. The Marsh Tit skins included 20 males, 23 females and 14 birds of indeterminate sex, with 30 first-years and 27 adults.

Of 199 live Marsh Tits examined, 100% showed pale (whitish) cutting edges to the bill and distinct pale marks on the proximal area of the upper mandible, and were scored as '1' (Fig 1a). Of the Marsh Tit skins examined, 96.5% (55/57) displayed obvious pale marks as in live birds. Of the two skins (both *P. p. dresseri*) that were scored as '0', small and diffuse pale marks were judged to be present but they were not clearly discernible. Of the 27 live Willow Tits, pale marks were found on the upper mandible of just two birds (7.4%), with one showing pale marks on one side of the bill only and this being attributed to abrasion. The remainder all had dark, unmarked upper mandibles (Fig 1b). Live Willow Tits did show a very narrow pale cutting edge to the lower mandible that was visible when the bill was open, and similar to Marsh Tit, but this was not possible to check on skins due to the bills

being rigidly closed; accordingly, only pale marks on the upper mandible were considered in analyses. Abrasion was also found on the upper mandible of one Willow Tit skin (race *P. m. montana*), again on one side only, although a further three (*P. m. kleinschmidti*) displayed obvious pale marks similar to Marsh Tit, and a further two (also *P. m. kleinschmidti*) showed diffuse marks, resulting in these six skins being scored as '1'. The other 106 Willow Tit skins (94.6% of skins examined) showed no pale marks and were scored as '0'. Pooling the live bird and skin samples, 98.7% of Marsh Tits (of 256 birds) and 94.2% of Willow Tits (of 139 birds) were correctly identified using the bill criterion alone. If a more stringent test were applied to Willow Tits, requiring pale marks on both sides of the upper mandible and thus discounting individuals with asymmetrical abrasion, the probability of accurate identification became 95.7% for that species. Pooling all samples (395 birds), the probability of accurately identifying an unknown bird as a Marsh Tit or a Willow Tit, based only on the presence or absence of pale marks on both sides of the upper mandible, was 98.0%.

The bill criterion proposed by Dewolf (1987) was therefore validated as a highly reliable method of separating Marsh Tits and Willow Tits. Some refinement was necessary as Willow Tits also showed pale cutting edges to the lower mandible. Therefore, only marks on the upper mandible should be considered – specifically distinct pale features at the proximal end, below the nostril and towards the cutting edge of the bill sides. This feature appears to be independent of age, sex, and geographical location (in the races examined). Abrasion marks on the bills of Willow Tits are a potential pitfall,



**Figure 1.** Bills of typical Marsh Tit (a) showing pale cutting edge and mark on proximal part of upper mandible, and Willow Tit (b) showing unmarked upper mandible.

although these were rare and easily detected due to being asymmetrical. Very young juvenile birds in their first month or so after fledging were not examined, and it is possible that remains of the nestling gape-flange on such birds may also be a pitfall. Cramp & Perrins (1993) reported that juvenile Willow Tits retain pale yellow gape-flanges and cutting edges for the first few weeks after fledging. Very few birds of this age are likely to be caught by ringers, however, as they are still largely dependent on their parents during this period. Nevertheless, the reliability of the bill criterion is significantly higher than that of all other known separation criteria used in the hand, such as relative tail-feather measurements, cap gloss wing panel (Scott 1999), and it may be used in isolation with a very low risk of misclassification. As such, the bill criterion is a powerful new tool for ringers and scientists in aiding accurate population monitoring of these two declining species.

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