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# Seasonality of the Arctic Warbler *Phylloscopus borealis* in northern Korea, with refutation of previous assumptions of Korean breeding

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Standard reviews list Arctic Warbler *Phylloscopus borealis* as a probable breeder in northern Korea, as well as passage migrant; the most recent states that spring passage begins c. 10 April and finishes within May. Near-daily structured counts in north-central Korea (Pyongyang and Hyangsan) during 2000–2003 showed, by contrast, that regular spring passage runs from early–mid May into early June, and that autumn return begins in early August, dates reflecting modern data from elsewhere in East Asia. Specific searches in the Myohyang Mountains, site of most postulated ‘breeding’ records, found no evidence of summer residency, let alone breeding. Korean breeding was assumed from records outside the then-perceived passage seasons, but these perceptions were flawed and, combined with misidentification, led to the unsupportable conclusions of breeding. In fact, a summer gap in acceptable past records spans almost the same dates as today’s summer absence from Pyongyang and Hyangsan, both undoubtedly only passage sites. The species may yet be found to breed in northern Korea, but there is no evidence, even circumstantial, that it does so. Past assessments that regular passage begins in mid April were evidently in error, reflecting past difficulties of species identification.

Key words: Arctic Warbler, *Phylloscopus borealis*, Korea, migration phenology, breeding range, historical records reassessment, abundance

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## INTRODUCTION

Tomek (2002) described the Arctic Warbler *Phylloscopus borealis* in northern Korean as a ‘‘passage migrant and probably rare breeding species’’, arriving after the first third of April. Some other sources consider it a Korean breeder (Baker 1997, Won Pyong-Oh 2000), implied breeder (Lee *et al.* 2000), probable breeder (Austin 1948, Gore & Won Pyong-Oh 1971, Watson *et al.* 1986, Won

Pyong-Oh 1996, Tomek 2002), presumed breeder (Fiebig 1995), or possible breeder (Vaurie 1959, Dementiev & Gladkov 1968, Glutz von Blotzheim *et al.* 1991, Cramp 1992, Park Jin-Young 2002). However, Wolters (1980), Cheng (1987), Sibley & Monroe (1990, 1993), Chrabrij *et al.* 1991, Lowther (2001) and Stepanyan (2003) excluded Korea from the breeding range, while Mauersberger (1981) left the matter open, and Dickinson’s (2003) range description is too telegraphic to

tell. These conflicting statements have confused popular works, e.g. MacKinnon & Phillips (2000) mapped much of Korea in the breeding range.

This uncertainty is not unreasonable: the Korean peninsula has been ornithologically only patchily explored, with the northern provinces (today's Democratic People's Republic of Korea, or 'North Korea') particularly poorly known (Tomek 1999, 2002). There are too few extant specimens from northern Korea to validate past assessments, reflecting a unique set of circumstances (Sweet *et al.* in press). Hence, I sought Arctic Warblers in and around a purported breeding area to check for breeding status and migration phenology, to re-assess the status and seasonality of Arctic Warbler in northern Korea.

## METHODS

Birds were surveyed through direct field observation at several sites (Fig. 1) between April 1999 and November 2004, the intensity increasing until 2003 (number of days with at least several hours of observation: 14 in 1999; 60 in 2000; 137 plus two from R.J. Tizard in 2001; 219 plus 13 in 2002; 247 in 2003; and 52 in 2004). In Pyongyang, observations were spread in all weeks of the year, and in Hyangsan in most weeks, excepting some of January and August and most of February. Standardised routes were followed each day at Moran, Munsu and Hyangsan, allowing comparison of counts between days within each site; but routes varied along the Taedong. Myohyang was visited less regularly, but multi-day forays deep into the protected area, across its entire altitudinal range (100–1909 m), were spread across the breeding season. Chief characteristics of each site are given in Duckworth (2006: Table 1). Arctic Warbler is very similar in plumage to Greenish Warbler *P. trochiloides plumbeitarsus* (Beaman & Madge 1998), a locally common breeder in Myohyang's higher altitudes, and rare passage migrant through Pyongyang (own data). Silent birds may elude certain identification, but song and calls allow easy identification (e.g. Lekagul &



**Figure 1.** Survey sites during 1999–2004 were located in Pyongyang (Diplomatic Compound, Moran-bong Park, Munsu-bong Park, Taedong-gang) and Hyangsan (including the Myohyang mountains).

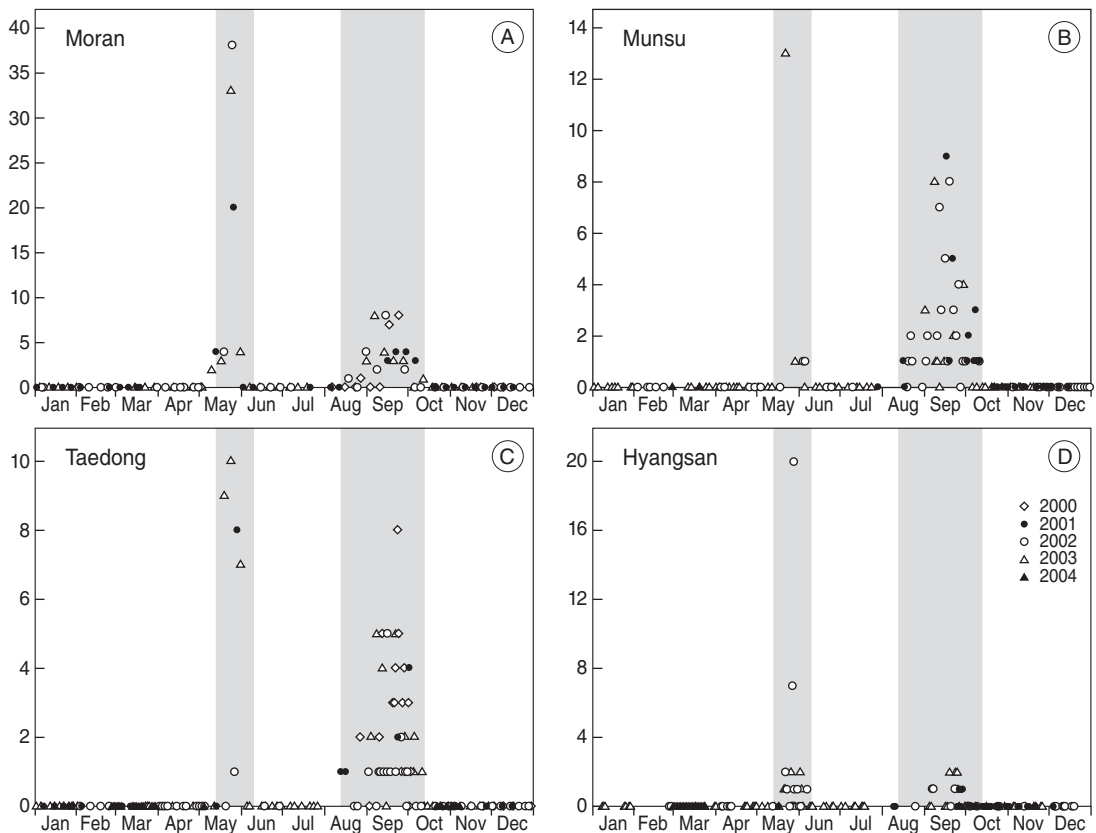
Round 1991) and I knew both species from several years in South-East Asia, where both abound seasonally (e.g. Thewlis *et al.* 1996). Suspected Arctic Warblers in Korea outside what I came to see as the species's regular period were followed until confirmed by call.

## RESULTS

In both Pyongyang (Moran, Munsu and Taedong) and Hyangsan, spring passage was brief and late, with high peak counts, whereas autumn passage was protracted with lower peak counts (Fig 2A–D). Birds were commoner at Pyongyang sites than at Hyangsan (routes at Munsu, Taedong and Hyangsan were similar in length). Spring birds sang a lot; during peak passage, this sound could dominate the mid-morning urban air, with birds using the tall trees along otherwise almost unvegetated city-centre streets. Two forms were clearly separable by song in Pyongyang in spring 2003.

Birds with a repeated unit of a single note greatly predominated and occurred throughout the passage period; but on 30 and 31 May, five birds sang with a double-note repeated unit ('dji-djim'). Records are as follows: *PYONGYANG*: *Moran* (Fig. 2A): earliest 10 May 2003 (two birds), 13 May 2001 (four), and by at least 19 May 2002 (four), peaking at 38 on 25 May 2002, 33 on 24 May 2003 and 20 on 26 May 2001; last recorded on 31 May 2003 (four birds). No zero-counts between those of 3 May (2003) and 2 June (2001). Singles on 18 August 2002 and 27 August 2000, rising to eight on 6 September 2003, 14 September 2002 and 24 September 2000, falling to three on 6 October 2001 and one on 11 October 2003. Only

two zero-counts between those of 24 August (2002) and 4 October (2003). *Munsu* (Fig. 2B): three on 15 May 2001; four on 19 May 2003, 20 May 2002; 13 on 22 May 2003; singles on 29 May 2003 and 5 June 2002. Singles on 16 August 2001 and 20 August 2002, up to three regular until at least 29 September 2003, 11 October 2001 and 2002; higher numbers (up to nine) within 8–29 September. No zero-counts between those on 18 May (2002) and 5 June (2003); only three between those on 19 August (2002) and 6 October (2003). *Taedong* (Fig. 2C; relatively under-visited in May): eight on 27 May 2001; one on 25 May 2002; 7–10 on 18, 23 and 30 May 2003; singles (different birds) on 12 and 15 August 2001; two



**Figure 2.** Counts of Arctic Warblers along standard routes (A) in Moran Park, Pyongyang, (B) in Munsu Park, Pyongyang, (C) along the River Taedong, Pyongyang, (D) at Hyangsan.

Indicated are the main periods of migration in spring (10 May – 6 June) and autumn (12 August – 11 October).

on 26 August 2000; up to five most observation days during September 2000, 2001, 2002 and 2003, eight on 22 September 2000; four on 1 October 2001; odd singles to 10 October (2003). Only one zero-count between those on 12 May (2001) and 4 June (2003), only three between those on 24 August (2002) and 29 September (2002). *Diplomatic Compound*: 1–2 on 26 May 2001, 23 August, 13, 24 September 2002, 19, 22 May, 15 September 2003. *HYANGSAN* (Fig. 2D): 1–2 birds over 20 May – 1 June 2003, 21 May – 6 June 2002, 6–23 September 2002, 19–25 September 2003 and 26–28 September 2001; also seven on 26 May and 20 on 27 May 2002. Many zero-counts even within periods of occurrence. *MYOHYANG*: four on 19 May, one on 20 May 2001; one on 24 May, dozens (uncountable) on 26 May, 17 on 27 May 2002 (120–1300 m, the entire range covered on these dates). There were no records on multi-day breeding-season surveys across the entire altitudinal range of Myohyang, during 6–13 June, 30 June – 5 July and 25–29 August 2002, 10–11 June and 1–3 July 2003.

## DISCUSSION

### Spring arrival

The Arctic Warbler was the latest leaf warbler (of six regular species; own data) to pass through the survey sites in spring, occurring during 10 May – 6 June with a peak around 25 May. The very many zero-counts outside this period from all sites (Figs 2A–D) allow these dates to be considered precisely informative.

Tomek (2002) traced past spring records from northern Korea mostly within 9 May – 4 June, with an outlier on 6 May 1958. In addition, she listed over a dozen claims each from April (earliest 10 April) and (see below) later in June. The only two April records after 1958 were of 1–2 birds at two sites on 22 April 1987, from an inexperienced European team that recorded no Pale-legged Leaf Warblers *P. tenellipes* anywhere (Głowaciński *et al.* 1989); yet (with first arrivals to my survey sites of 21–28 April; own data) many must have arrived

during this team's field time, which ran until 4 May. The team used a field guide (WBSJ 1982) that (appropriately for Japan) described as the song of *P. tenellipes* that of the then unrecognised Sakhalin Leaf Warbler *P. borealoides*, morphologically barely distinguishable (Irwin *et al.* 2001). Real *P. tenellipes* song, as given in Korea (sonogram in Fiebig 1995: 68), is completely different (Weprintsew *et al.* 1990), and resembles WBSJ's (1982) description of Arctic Warbler song. Hence, these April 1987 records, involving two songsters, are very likely to be misidentified Pale-legged Leaf Warblers.

Tomek (2002) listed a 16 April 1958 specimen in the Pyongyang Academy of Sciences, which was confirmed critically as *P. borealis* by J. Fiebig (pers. comm. 2006). All other April claims in Tomek (2002) come from Prof. Won Hong Koo's writings. They are not supported by Academy of Sciences skins (T. Tomek pers. comm. 2004), even though Won's writings were based on this collection. These 1920s–1950s records must, in aggregate, reflect a systematic identification error. One or two freakishly early dates could not be discounted, but this number, and their span over two thirds of April, presuppose a spring passage in the 1950s several weeks earlier than nowadays. Yet Austin (1948) traced but three Arctic Warbler records before 9 May; none can now be re-confirmed. One is from 19 April 1928, as in Tomek (2002). Two birds (from 10 April 1930) were in a Japanese collection destroyed in spring 1945. Another from 19 April 1928, held in the United States National Museum of Natural History, was presumably not examined by Austin or, critically, by USNM staff (Austin [p. 27] stated that "I also wish to thank [H. Friedmann of USNM] for furnishing a list of the Korean material acquired there since Jouy's day [from Korean collectors, since 1886], and for examining for me some of Jouy's material [but by implication, none of the later skins]"). J. Dean (pers. comm. 2005) cannot trace this specimen in USNM, neither as Arctic, Greenish nor Pale-legged Leaf Warbler. Austin (1948: 216) himself "shot [leaf] warblers on sight, and saw practically none that [he] did not collect", but he found no Arctic

Warblers; he covered Suwon (37°16'N, 127°01'E), 220 km south of Pyongyang, and ceased observations on 3 May 1946. To have found Arctic Warbler by then would indeed have been a trifle early for the species by my dates, but expected if Won's dates were correct.

For southern Korea, Gore & Won Pyong-Oh (1971) stated that Arctic Warbler was the "most common leaf warbler on migration in April–May", presumably based on Austin (1948): no original data are presented. Park Jin-Young (2002) traced for April only the two "19 April 1928" claims, and singles collected in Busan (35°06'N) on 28 April 1962 and on Cheju island (33°N) on 28 April 1990. Similarly, in several recent springs with very high search effort, N. Moores (pers. comm. 2006) found that, as in Pyongyang and Hyangsan, Arctic Warblers passed mainly from c. 5 May into early June (e.g. 8 June 2005, from Eochong island, 36°10' N, 125°58'E), with an atypically early bird in Busan on 7 April 2005; there are a few southern Korean records up to mid June from sites where breeding is known or assumed not to occur (see below). The few Korean April records (e.g. the 1962 and 1990 specimens) may involve Japanese-breeding *P. b. xanthodryas* which returns within April (Brazil 1991), although the main arrival is not until mid May (Cramp 1992).

Discounting the past, erroneous, April records, spring passage through northern Korea reflects timing at latitudinally-similar Beidaihe (China; 39°47'N, 119°27'E; mainly from mid May to c. 7 June, peaking distinctly in late May; Williams & Hsu 1992, Williams 1995) and arrival into the southern Russian Far East, a little to the north, from mid May (Cramp 1992).

### Breeding status

Myohyang is the site of most purported Korean breeding-season records, yet I found no Arctic Warblers there within June–August. Although I visited only c. 20% of Myohyang's c. 330 km<sup>2</sup>, this included all forest types and the entire altitudinal range. Some warblers almost cease singing once paired, e.g. Sedge Warbler *Acrocephalus schoenobaenus* (Catchpole 1972) and hence nesters can be

overlooked, but Arctic Warbler sings right through the breeding season (Cramp 1992). Thus, it seems most unlikely that the latter now breeds in Myohyang, if indeed it ever did so.

Korean breeding has been inferred only through June presence, e.g. Tomek (2002) stated that spring passage finished within May and that "June [records] make the evidence of nesting". Tomek (2002) traced 11 records from mid or late June, several from Myohyang, the others from four provinces to the south. The eight 1949–1957 records are from Prof. Won; none is supported by an extant specimen. The 1983 records were signed '?' by Tomek (1985) and may not be correct (T. Tomek pers. comm. 2006). Only the six specimens from 8 June 1917 (Austin 1948) bear authority. But birds up to this date, even a little later, could simply be late migrants (see above); birds regularly occur into late May way to the south, at 22°18'N, in Hong Kong (Carey *et al.* 2001). Park Jin-Young (2002) presented only two June records from southern Korea additional to Austin's: four specimens from Chilbal island (34°47'N, 125°47'E) on 16 June 1985 (perhaps the date of identification rather than of death; N. Moores pers. comm. 2006), and one seen on Hong island (34°25'N, 125°15'E) on 12 June 1997. N. Moores (pers. comm. 2006) saw one on 13 June 2003 on Eochong island. The species does not breed on Chilbal or Eochong, nor is it likely to do so on Hong (N. Moores pers. comm. 2006).

Tomek (2002) traced no northern Korean claims between 22 June and 11 August. Among other forest passerines known or assumed to breed in northern Korea, only Ashy Minivet *Pericrocotus divaricatus* and Asian Paradise-flycatcher *Terpsiphone paradisi*, both also of questionable breeding status, show a comparable summer gap in records assembled by Tomek (2002). There is no obvious reason why, if Arctic Warblers did breed in the 1950s, they were not collected in this seven-week gap: Myohyang and various sites farther north in Korea (where some boreal species do breed) were visited frequently in June and July by Korean teams in the 1950s–1960s and east European ornithologists in the 1980s (Tomek 2002). The

date of 11 August is similar in timing to autumn return to Pyongyang and southern Korea (see below), so is not even weakly suggestive of breeding. Fiebig (1995) assumed Arctic Warblers he saw in the northern highlands on 17 August 1989 bred locally, because some were in song; but this warbler sings on autumn passage. Songsters were noted systematically in autumns 2002 and 2003 in Pyongyang: there were singles in Munsu on 12, 16, 19 and 26 September 2002, and 1, 8 and 22 September 2003; and in Moran on 21 September 2002. Most gave only short, quiet phrases; none was in prolonged song. Song is regular into September and even October elsewhere (Cramp 1992).

There is one breeding-season report from southern Korea (in Kangwon province on 21 July 1981; no other details), which Park Jin-Young (2002) felt might indicate Korean breeding. Further data are needed to evaluate this.

Austin (1948) concluded (despite great scepticism of others' suppositions of Korean breeding for many species) that Arctic Warbler was "perhaps a not uncommon summer resident in the highlands", even though he traced no specimens from within 9 June – 9 August (a gap strikingly similar to summer absence in 2000–2003). He was presumably swayed by past descriptions as rare in summer (Taczanowski 1888: 463), common and breeding (from Won Hong Koo) and "a summer resident in the forest of the mountains. Its weak little song may be heard all through the summer months" (Cumming 1933: 35). This more fairly describes Pale-legged Leaf Warbler's song than Arctic's; Austin (1948), who traced only six Korean records of the former (none in the breeding season), only grudgingly admitted the possibility of its breeding in Korea; yet it is an abundant breeder in Myohyang (Fiebig 1995; own data) and summers, presumably breeds, widely elsewhere (Tomek 2002). Cumming, collecting no specimens, quite possibly confused the two: Arctic Warbler is the only *Phylloscopus* for which he wrote an account, despite his article "covering the most common [birds] in Korea".

### Autumn passage

By comparison with other landbird passage migrants, Arctic Warbler showed a very wide autumn period, of 12 August – 11 October. Early August was not well covered. These August records were doubtless genuine passage birds: passerines which did not breed in Pyongyang, but visited during post-breeding dispersal all appeared within July (e.g. Asian Brown Flycatcher *Muscicapa dauurica*, Pale-legged Leaf Warbler and Eastern Crowned Leaf Warbler *Phylloscopus coronatus*). Arctic Warbler was about the earliest long-distance migrant landbird to reappear in autumn; only Chestnut Bunting *Emberiza rutila* was comparable (own data).

Tomek (2002) traced many past autumn records from northern Korea, mostly within 17 August–6 October, with outliers on 11 August 1983 (see 'breeding', above) and 16 October 1978 (one bird; Bocheński *et al.* 1981). Austin (1948) listed only a single August record, on 10 August 1927. Park Jin-Young (2002) listed, in addition, one from 8 August 1969. There is even a record from Gunsan, much further south (35°59'N, 126°43'E), on 1 August 2004, and as many as 12 birds were seen on Socheong island (37°45'N, 124°44'E) on 18 August 2005 (N. Moores pers. comm. 2006). In southern Korea, Gore & Won Pyong-Oh (1971) gave autumn migration as September–October, strangely omitting August. The species even reaches Hong Kong by mid August (Carey *et al.* 2001). It is also among the earliest passerines through Beidaihe (Williams *et al.* 1992), already in numbers by mid August (the start of observations), peaking in mid-late September, and stopping rather suddenly on c. 11 October (Duff *et al.* 2000); timing very similar my sites.

Tomek (2002) also listed records from 22 and 29 October 1926; whether or not these were correctly identified, N. Moores (pers. comm.) regularly finds the species at southern Korean migration watch-points into late October, with his latest record being of four birds on 1 November 2001 on Gageo island (34°03'N, 125°06'E).

## Conclusions

Past statements that Arctic Warblers habitually transit Korea throughout most of April lack corroborating specimen data or recent convincing sight records, and were evidently in error, although there are occasional records, especially at the end of the month. That spring passage through Korea extends predictably into June was previously under-appreciated. Past assessments of autumn passage through Korea all failed to indicate that return begins within early-mid August. A recent review of Arctic Warbler records in Hong Kong (Carey *et al.* 2001) also greatly revised understanding of true occurrence patterns.

There is no credible evidence that Arctic Warbler breeds in northern Korea. There is neither claim during 22 June – 11 August, nor reliable record during 8 June – 11 August. These dates reflect, within 1–2 days, those of mine for summer absence during 2000–2003. Failure to determine correctly when Arctic Warblers migrated through northern Korea led directly to the flawed assumptions of breeding there. I searched hard, but unsuccessfully, for breeding Arctic Warblers in Myohyang (whence came most of the postulated breeding-season records). The species might yet be found to breed in northern Korea; Cheng (1987) showed the southern limit of continental breeding at c. 45°N. Japanese *P. b. xanthodryas* breeds much further south, but various long-distance migrant passerines breed on Japan but not in Korea (Vaurie 1959).

Discrepancies between past claims and current records reflect identification difficulties. Even in well-, and capably, watched Hong Kong Arctic Warbler and *P. t. plumbeitarsus* were much confused until subjected to specific effort (Leader 1993). Pale-legged/Sakhalin Leaf Warbler is not a confusion risk today, but field identification of east Asian *Phylloscopus* evolved rapidly during the 1980s and particularly with publication of Lekagul & Round (1991). They were muddled in spring 1985 at Beidaihe (Williams 2000: 98, 143), and many past 'Arctic Warblers' in Hong Kong were probably Pale-legged/Sakhalin Leaf Warblers (Carey *et al.* 2001). T. Tomek (pers. comm. 2006)

found, in the Pyongyang Academy of Sciences, at least nine misidentified *Phylloscopus* specimens, including specimens of both *P. trochiloides* and *P. tenellipes* / *P. borealoides* labelled as Arctic Warbler. Hence, Won Hong Koo's specific error with Arctic Warbler does not imply sub-standard general identification. Portrayed as error-prone by Austin (1948) and Tomek (1999, 2002), many of his breeding claims for other species that were bluntly (and, in today's terms, libellously) rejected by Austin (1948) have recently been corroborated (Duckworth & Moores in prep.).

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## SAMENVATTING

Bladzangers zijn vaak lastig op naam te brengen, wat tot onvolledige of zelfs onjuiste informatie over de verspreiding en status van een soort kan leiden. Vooral informatie gebaseerd op oude waarnemingen behoeft een kritisch oog. Dit wordt bevestigd door een analyse van historische waarnemingen van de Noordse Boszanger *Phylloscopus borealis* in ZO-Azië. De soort staat in noordelijk Korea als waarschijnlijke broedvogel te boek met een voorjaarsstrek die van ongeveer 10 april tot in mei doorloopt. Tellingen langs vaste trajecten in Pyongyang and Hyangsan in 2000–2003 lieten echter zien dat de voorjaarsstrek pas vanaf begin tot half mei op gang komt en dat doortrekkers tot begin juni worden waargenomen. In de herfst arriveerden de eerste vogels begin augustus, wat overeenkomt met recente gegevens elders uit Zuid-Azië. In de bergstreek Myohyang, waar tevoren het broeden van de Noordse Boszanger werd vermoed, werden in de zomer geen vogels aangetroffen. Er wordt aannemelijk gemaakt dat oude 'broedgevallen' gebaseerd waren op waarnemingen van doortrekkers, al dan niet in combinatie met verkeerde soortdeterminaties. Betrouwbare waarnemingen uit het verleden laten een zelfde gat in het zomervoorkomen zien als het nu beschreven patroon. De auteur sluit niet uit dat de soort in het noordelijke deel van Korea broedt, maar tot nu toe bestaat er geen aanwijzing in deze richting. (JP)

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