LITTLE-KNOWN ASIAN BIRD

First wintering record of the Sakhalin Leaf Warbler *Phylloscopus borealoides* in South-East Asia, with notes on vocalisations

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Introduction

On 15 December 2013, a possible Pale-legged Leaf Warbler *Phylloscopus tenellipes* was observed by KKL on the western edge of Bukit Timah Nature Reserve, Singapore, in tall secondary forest. Subsequent visits found at least two individuals at this location (Plates 1 & 2). The birds were observed foraging on the forest floor and on low shrubs and vines, but were also seen on a number of occasions in the middle storey to canopy, a behaviour seldom encountered during our field experiences with Pale-legged Leaf Warblers in Thailand, Cambodia and Vietnam, where they typically forage on the ground or understorey. The warblers were identified provisionally as Pale-legged Leaf Warblers based on a combination of morphology, calls and the belief that Sakhalin Leaf Warbler *P. borealoides* is not known to occur in Singapore or the southern Malay Peninsula (Robson 2005, Wells 2007). Observations continued at nearly weekly intervals from 15 December 2013 to 14 March 2014. In addition to observing behaviour and ecology, a number of high-quality images were collected for morphological study while sound recordings were made using a Sennheiser ME66 microphone and a portable Olympus digital recorder for subsequent vocal analysis.

Description

Both individuals were dark olive-brown on the crown, showing a marked contrast with the olive-brown of the mantle and wings. At least one individual showed a dark crown which became paler towards the crown ridge, a potentially diagnostic character if seen well. Overall, the plumage appeared darker and more strongly washed green than the similarly-sized Arctic Warbler *P. borealis*, with obvious olive-green fringes to the flight feathers. The supercilia of both individuals appeared long and thin, extending to near the hind-crown and contrasting strongly with the dark eye-stripe. It was also noted that the supercilium was white with a faint buff wash above the eye and towards the lore. This combination of features is not found in Eastern Crowned *P. coronatus*, Arctic or Yellow-browed Warblers *P. inornatus*, all being regular winter visitors to forests in Singapore (Yong *et al.* 2013).

It was also noted that the underparts of both individuals were distinctly paler, appearing cool white, and quite unlike Arctic Warbler, which is often washed buff or light grey with fine diffuse streaking, or Eastern Crowned Warbler, which shows yellow on the vent and undertail-coverts. On the closed wing, both birds lacked the broad and

Plates 1 & 2. The presumed Pale-legged Leaf Warbler *Phylloscopus tenellipes* at Bukit Timah, now confirmed as Sakhalin Leaf Warbler *P. borealoides* based on vocal data, in March 2014.

FRANCIS YAP

FRANCIS YAP

well-defined wing-bar on the greater coverts, a consistent feature of Yellow-browed Warbler, or even the less conspicuous wing-bar on the median covert. However, there were thin pale fringes to the tips of the median and greater coverts, which formed two narrow wing-bars. Finally, both birds exhibited conspicuously pale pink legs, unlike other *Phylloscopus* warblers in Singapore, although there is the possibility that their paleness may have been accentuated by poor light conditions or the health of the birds.

Vocalisations

The recordings of the calls added further support to the initial identification as Pale-legged Leaf Warbler. Both birds were vocal, particularly in the late morning (09h30–11h00) and a number of high-quality recordings were obtained. The most frequently uttered call was a thin, high-pitched note of a plaintive quality, and has been described as a shrill *tsink* (Wells 2007). Each note lasted approximately 0.5 seconds, and was made at intervals of 1.5 to 3.0 seconds. Although not vocal initially, the two birds responded to playback of their call, and called more frequently and loudly after the playback attempts, and came closer to investigate the source of the call. This call was familiar—being that of Pale-legged Leaf Warbler from mainland South-East Asia, and all of the other possible *Phylloscopus* warblers known to occur in Singapore were therefore eliminated.

Vocal analysis

The calls of seven unequivocal Pale-legged Leaf Warblers recorded on the breeding grounds in north-east China, and a further 13 individuals provisionally identified as this species, recorded from stopover or wintering sites in east China (3), Vietnam (1), Cambodia (8), Thailand (1), were analysed. These were compared with recordings of the Singapore birds, using Raven Pro 1.4 software. The duration, low frequency, high frequency and peak frequency of a minimum of three calls per individual were measured. The mean of each parameter for every individual recording was calculated. For the seven Pale-legged Leaf Warblers from north-east China, the mean length of call duration, low frequency, high frequency and peak frequency were calculated and the mean 95% confidence intervals computed. All recordings of Pale-legged Leaf Warbler and individuals identified as this species were obtained from the Xeno-canto database (www.xeno-canto.org)

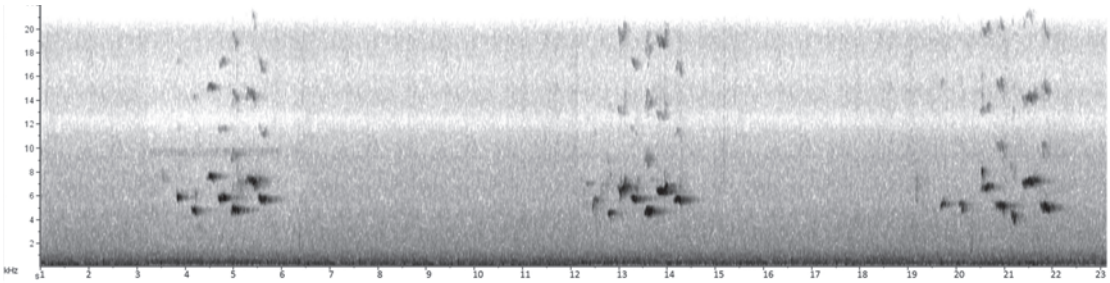
Establishing the identity of the Bukit Timah warblers

The regular occurrence of the warblers at the site provided a unique opportunity to document the song and verify the birds' identity. In early March, recordings of the songs of both Pale-legged and Sakhalin Leaf Warblers from the Xeno-canto database were played to the birds to elicit a vocal response. During playback, it was noticed that both warblers called more frequently and were drawn to the song of the Sakhalin Leaf Warbler. On at least three occasions, an incomplete song which closely resembled that of the Sakhalin Leaf Warbler were heard and recorded. This (sub) song consisted of five or six high syllables, rising sharply on the second and descending on the next two syllables. These songs were consistent in structure, and no variants were heard. Many of the song strophes recorded were incomplete and lacked the last one or two notes present in other recordings of the Sakhalin Leaf Warbler (Figure 1). These vocalisations and behavioural responses suggested the birds were Sakhalin Leaf Warblers. Analysis of the recordings supported the identification, and eventually it was confirmed that the two presumed Pale-legged Leaf Warblers were, in fact, Sakhalin Leaf Warblers.

Comparison of the calls of Sakhalin and Pale-legged Leaf Warbler

Preliminary bioacoustic analyses of call recordings of confirmed Pale-legged Leaf Warblers from the breeding range of this species in north-east China were compared with the call recording of one of the wintering birds in Singapore. This demonstrated that the calls of Pale-legged Leaf Warbler are uttered

Figure 1. Sonagram of the song of Sakhalin Leaf Warbler recorded in Singapore.



at a consistently higher frequency than the calls of the Singapore birds (Figure 2–4). Comparison with recordings of Pale-legged Leaf Warbler in the Xeno-canto database from across a wide range of wintering locations in mainland South-East Asia (e.g. Thailand, Vietnam, Cambodia) also established the calls to be consistently higher-pitched than that of the call of the wintering

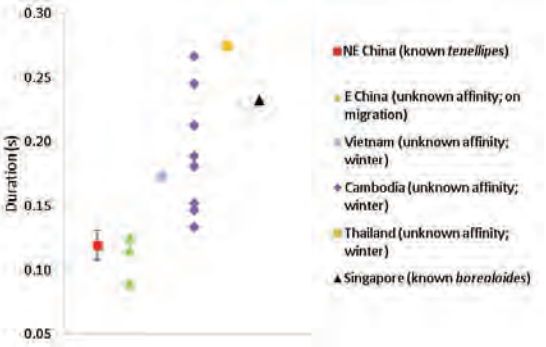


Figure 2. Low frequencies of the calls of Pale-legged and Sakhalin Leaf Warblers samples, means and 95% confidence intervals of seven Pale-legged Leaf Warblers recorded in north-east China; call durations of 13 individuals identified as Pale-legged Leaf Warblers recorded in east China (3), Vietnam (1), Cambodia (8), Thailand (1); and of one Sakhalin Leaf Warbler recorded in Singapore.

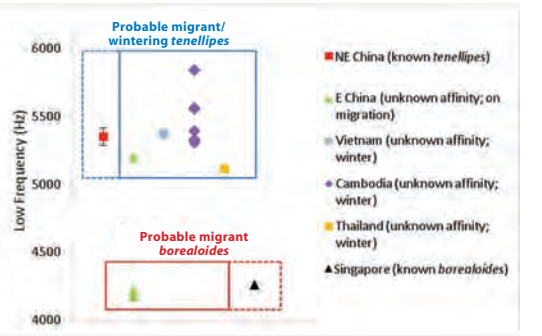


Figure 3. High frequencies of the calls of Pale-legged and Sakhalin Leaf Warblers samples, means and 95% confidence intervals as Figure 2.

Singapore birds, and closer to frequency parameters of known Pale-legged Leaf Warblers recorded on their breeding grounds. In contrast, three individuals sound-recorded at Beidaihe, on the east China coast, showed notable dissimilarity and may pertain to both Pale-legged Leaf Warbler (1) and Sakhalin Leaf Warbler (2) based on their call sound profile, indicating that the migratory pathways of the two sister species may largely overlap.

The bioacoustic analyses were subject to a low sample size that precluded comparisons of

Plate 3. Pale-legged Leaf Warbler from Phu Khieo Wildlife Sanctuary, Chaiyaphum, northern Thailand, January 2012.

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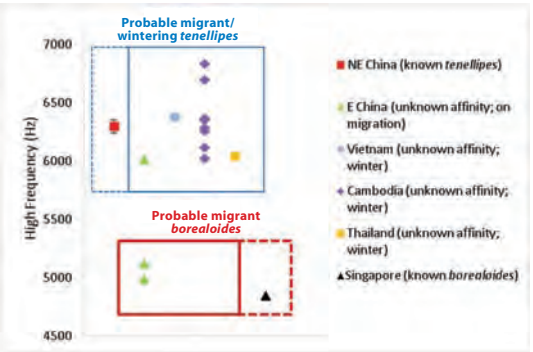

Figure 4. Peak frequencies of the calls of Pale-legged and Sakhalin Leaf Warblers samples, means and 95% confidence intervals as Figure 2.

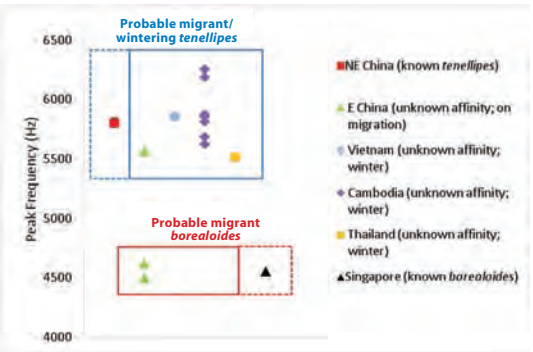

Figure 5. Duration of the call of Pale-legged Leaf Warbler *Phylloscopus tenellipes* and Sakhalin Leaf Warbler *P. borealoides*; means and 95% confidence intervals as Figure 2.

'populations' (e.g. Indochinese winterers versus north-east Chinese breeders) at the significance level. Higher sample sizes are needed, especially of confirmed Sakhalin Leaf Warblers, to establish that frequency parameters between the calls of the two species are consistently different and do not overlap at mid-frequencies. However, the division of the call dataset into roughly two frequency classes suggests that call note frequency may be species-specific. In contrast to the frequency parameters, it was noted that the call duration did not demonstrate any recognisable geographic or taxonomic pattern across the samples studied (Figure 5), and therefore is unlikely to be of use in distinguishing the two species.

Behaviour

As is typical of the behaviour of Pale-legged Leaf Warblers (Wells 2007), the Sakhalin Leaf Warblers were observed to forage regularly on the forest floor, gleaning insects from the leaf-litter, as well as from low shrubs and vines about 1–2 m above the ground. When foraging on these low vines, the warblers quickly climbed up vertical branches and stems, picking off small items from the undersides of leaves. Specific prey could not be identified. On rare occasions, both individuals were also observed to forage in the middle-storey and canopy, up to least 5 m above the forest floor. No interactions between the two individuals were seen, but they briefly joined a foraging flock of Pin-striped Tit-Babbler *Mixornis gularis*. All observations were made along a 200–300 m section of the forest trail at Bukit Timah, which suggests they were behaving territorially, but possibly only defended small territories. This appears to be consistent with a separate observation of a (now hypothetical) Pale-legged Leaf Warbler by DLY in Bukit Batok Nature Park, Singapore, in 2012.

Status and distribution

The Sakhalin Leaf Warbler is a poorly known East Asian breeding bird restricted to the Russian islands of Sakhalin and the southern Kuril Islands (e.g. Kunashiri and Etorufu), as well as Hokkaido and northern Honshu in Japan (Shimba 2008, Brazil 2009). Also known as the Eastern Pale-legged Leaf Warbler until recently (see Imanishi *et al.* 2009), this taxon was formerly included within Pale-legged Leaf Warbler (Plate 3) of north-east China, the Korean peninsula and the Russian Far East. Morphologically, the two taxa are very similar and there are no known means of separating silent birds in the field (Hachisuka *et al.* 1932, Committee for Check-list of Japanese Birds 1997). In recent years several authorities have recognised Sakhalin Leaf Warbler as a distinct species (Martens 1988, Sibley & Monroe 1990, Weprincew *et al.* 1989, 1990) on the basis of its distinctive song (Martens 1988, Brazil 2009) and a number of subtle morphological differences, particularly its consistently longer wing length (Brazil 2009, Bakewell 2014).

Given the difficulties in separating the species in the field using easily diagnosable characters (Brazil 2009, Carey *et al.* 2001), the wintering distributions of both Pale-legged and Sakhalin Leaf Warblers are poorly defined and for the latter remain virtually unknown (Yong *et al.* in press). While it is possible to distinguish the two species by song in the winter range, this may only be possible within a narrow time-frame prior to spring departure. It remains impossible to separate the two species on autumn passage unless birds are trapped and measured. The lack of definitive records of Sakhalin Leaf Warbler in South-East Asia possibly led to it being omitted from contemporary regional field guides (e.g. Robson 2008).

Recent ringing exercises on Ko Man Nai Island, south-east Thailand, have revealed that both species occur on autumn passage here (Robson

2013), thus providing some evidence that both species overwinter on the Thai-Malay peninsula. Furthermore, bird-ringing in northern Peninsular Malaysia has conclusively established that Pale-legged Leaf Warbler winters at least as far south as Perlis (D.R. Wells *in litt*. 2014). The Pale-legged Leaf Warbler is included in the Singapore checklist based on a single sight record in 2009 (Yong *et al*. 2013), but this is now questionable in the light of these findings. Elsewhere in the region the wintering range of the Sakhalin Leaf Warbler is virtually unknown (Yong *et al*. in press).

These observations are the first confirmed records of the species in Singapore, and also from anywhere within its presumed wintering range in South-East Asia. Furthermore, there are recent records from Peninsular Malaysia where singing birds have been observed in scrub in Penang on 22 March 2014 (Bakewell 2014) as well as northern Peninsular Thailand (Kaeng Krachan National Park) where FER recorded a singing bird on 4 April 2014. Both these records are likely to refer to individuals on migration. Given the distributions of comparable winter visitors to the region, it is possible the species winters in the Thai-Malay peninsula and should be looked for in Sumatra. However, considering that Pale-legged Leaf Warbler has also been reliably recorded in northern Peninsular Malaysia (D. R. Wells *in litt*. 2014), it remains unclear if the wintering ranges of the two species overlap, and if so to what extent. Given the difficulties involved in the separation of Pale-legged and Sakhalin Leaf Warblers, it is recommended that all past records of Pale-legged Leaf Warbler from the region be re-evaluated.

Presently, Sakhalin Leaf Warbler is listed as Least Concern (BirdLife International 2014). However, its use of lowland forest (Wells 2007) suggests that it is threatened by widespread habitat loss. The rapid destruction of Sundaic forests by logging, agriculture and periodic fires threatens a number of poorly known wintering migrants from temperate East Asia, and has been overlooked by conservationists (Yong *et al*. in press). More data in the form of detailed records (with habitat information and numbers) contributed by birdwatchers in the winter months will be important to fill these knowledge gaps and updating the species's conservation status.

Conclusion

The Sakhalin Leaf Warbler is widely recognised as a distinct species (Martens 1988, Sibley & Monroe 1990, BirdLife International 2014). However, it remains largely inseparable from Pale-legged Leaf Warbler without audible or morphological confirmation. It is recommended that all older Pale-legged Leaf Warbler records in Peninsular Malaysia are re-evaluated, although most were reported between December and February when birds do not sing, and specific identification may not be possible.

The discovery of Sakhalin Leaf Warblers wintering in Singapore has raised the profile of this poorly known species. Birdwatchers and bird-ringers are urged to look for this species in Peninsular Malaysia and western Indonesia, especially in March when birds appear to become more vocal. If birds are trapped, wing measurements and formulae should be taken as a potential means of distinguishing male Sakhalin and Pale-legged Leaf Warblers (P. D. Round *in litt*. 2013). However, it must be cautioned that given the considerable overlap in wing length, only individuals with wing lengths that exceed the upper limit for Pale-legged Leaf Warblers can be definitively identified, and this will usually pertain to males.

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