

## LITTLE-KNOWN ASIAN BIRD

# Nesting records of Dulit Frogmouth *Batrachostomus harterti*, with notes on plumage and vocalisations

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## Introduction

The genus *Batrachostomus* comprises 12 species widely distributed throughout the Oriental region, from South Asia and South-East Asia to the Philippines and Greater Sundas. Due to their nocturnal habits, cryptic colouration and preference for undisturbed rainforest habitat, they are some of Asia's least understood birds. One species in particular, the enigmatic Dulit Frogmouth *B. harterti*, encapsulates all of these traits and is one of Borneo's least known and most sought-after avian endemics.

Dulit Frogmouth is known only from four montane areas in central Borneo: Gn. Dulit, Usun Apau plateau and the Kelabit Highlands in north-east Sarawak, and Gn. Liang Kubang in Kalimantan (Cleere & Nurney 1998, Myers 2009). It was first collected by Charles Hose in 1891 at about 600 m on Gn. Dulit in northern Sarawak (Smythies & Davison 1999) and described by Sharpe (1892). A further seven specimens were collected in the 1950s, six from Sarawak and one from Kalimantan (Holyoak 1999) but after that the species eluded detection. It has been described as a submontane specialist, preferring primary and secondary growth at 300–1,500 m (MacKinnon & Phillipps 1993, Cleere & Nurney 1998) although confusion with the similar and more widespread Large Frogmouth *B. auritus* of the lowlands has cast doubt on records from lower elevations (Holyoak 1999).

One serious problem was the lack of knowledge of the vocalisation of the species. This was solved in 2004 when the song was recorded in the Kelabit Highlands, Sarawak (Yong & King 2010). However, it was only in 2009 that John Arifin obtained the first images of the species in the field, again from the Kelabit Highlands. Efforts by several birdwatchers to see it were unsuccessful, although it was heard on two occasions at two different sites, Ba'kelalan and Long Lellang, both in the Kelabit Highlands, by JAE and Mark Bezuijen. The trail went cold until March 2013 when SS, a resident of Ba'kelalan village near the Kalimantan border, found and photographed a large frogmouth on a nest. His images were circulated and identified as Dulit Frogmouth by JAE, who visited the area in January 2014 and found a pair at the same location

before dawn, and roosting separately later the same morning, about 50 m apart, 5 m off the ground, and obtained images on 5 January 2014 (see [www.orientalbirdimages.org](http://www.orientalbirdimages.org)). In this article, we document for the first time aspects of the breeding biology based on observations made at a nest site in the same area between March and April 2014. We also provide updated information on identification and vocalisations, including a previously undescribed call.

## The second nesting record of Dulit Frogmouth

On 3 March 2014, BWL, AB and STY arrived in Ba'kelalan village and were taken by SS to the site. At 19h30, a single bird was heard uttering a level, low-pitched whistle three times in quick succession at close range (as described by Yong & King 2010). No further activity was noted that night. A pre-dawn vigil the next day was uneventful until 06h00 when a single bird was heard calling in the distance. Over the next 10 minutes, the bird appeared to be heading towards us, with the last call heard at 06h10, now at close range. A search around the area resulted in the discovery of a single Dulit Frogmouth sitting motionless on a nest on a horizontal branch. It was observed again in the late morning and late afternoon, in the same spot and position.

The nesting site was at 970 m, on private property about 2 km from Ba'kelalan. The property had been partially cleared for cattle grazing and durian orchards but retained a patchwork of secondary rainforest, contiguous with a large tract of primary dipterocarp rainforest beyond it. The Sungei Komap, a fast-flowing river, was the primary hydrological feature at the site. The nest site was located in a tract of slope forest with land cleared for pasture on two sides and the river at the foot of the slope (Plate 1). The nesting frogmouth in 2013 was photographed in the same area.

The nest was on the fork of two horizontal branches, 4 m above the ground and 20 m from the river, in secondary rainforest with a dense understorey of wild ginger and vine tangles (Plate 2). The large size of the incubating bird hampered observation of the nest, but subsequent analysis of photographs suggested a small cup-shaped

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**Plate 1.** The Dulit Frogmouth *Batrachostomus harterti* nest site located in a tract of slope forest with land cleared for pasture on two sides and the river at the foot of the slope, near Ba'kelalan village, Sarawak, March 2014.

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**Plate 2.** Secondary rainforest with a dense understorey of wild ginger and vine tangles, the nesting environment of Dulit Frogmouth near Ba'kelalan. The incubating frogmouth is barely visible in the background in the centre of the image, March 2014.

structure with whitish feathers drooping down the sides of the branch (Plate 3). Feathers, presumably down from the adult birds, are a feature of the nests of other *Batrachostomus* frogmouths (Cleere & Nurney 1998, Holyoak 1999).

Further observation in March 2014 confirmed the presence of the same individual during diurnal hours and its subsequent departure between 19h15 and 19h30 on at least two occasions. On 19 March, a small downy chick was seen on the nest. A diurnal visit on 9 April provided an observation of both parent birds and the well-developed chick at the nest (Plate 5). By 22 April, the chick had fledged and was seen perched together with both adults some distance from the nest.

**Identification and sexing**

A major challenge in the identification of Dulit Frogmouth is to distinguish it from the more widespread and very similar Large Frogmouth. This is complicated by the great scarcity of material for comparison—descriptions and illustrations of Dulit



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**Plate 3.** Incubating Dulit Frogmouth, most likely a female, showing the use of downy feathers in nest construction. Note the mostly hexagonal white spots on the distal wing coverts, although one spot on the more proximal wing coverts is drop-shaped, March 2014.

**Plate 4.** For comparison, incubating female Large Frogmouth *B. auritus*, Way Kambas, Sumatra, Indonesia, 31 July 2008.



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Frogmouth were based primarily on museum specimens. Not surprisingly, differences exist in the published literature of the diagnostic features used to separate the two species. MacKinnon & Phillipps (1993) highlighted the slightly smaller size and purplish-brown colouration of male Dulit Frogmouth compared with Large Frogmouth, while Cleere & Nurney (1998) noted the Dulit Frogmouth's smaller size, darker tones and richer chestnut colouration, as well as a barred crown (spotted in Large), less heavily spotted wing-coverts and darker, more boldly marked underparts. More recently, images of specimens from the Sarawak Museum published on Oriental Bird Images ([www.orientalbirdimages.org](http://www.orientalbirdimages.org)) were accompanied by remarks noting that Dulit Frogmouth specimens appeared smaller and darker than Large Frogmouths, but were otherwise indistinguishable (Q. Phillipps *in litt.* 2010). As a result, the altitude of the collection point became an important determinant in identifying the species.

From a study of images on the internet, examination of specimens, as well as our observations of the nesting birds, one diagnostic feature which stood out was the shape of the white spots on the wing-coverts. In Dulit Frogmouth, these spots are largely hexagonal in shape, and most differ markedly from those of Large Frogmouths, which are mostly triangular, slightly 'pinched-in', often

with a needle-like extension that gives the spots a drop-like shape. However, our two adult Dulit Frogmouths did have some drop-shaped spots on the more proximal wing-coverts, so this shape is not completely absent in Dulit Frogmouth plumage. This feature was consistent in all internet images of Dulit Frogmouth with the exception of a specimen in Sarawak Museum, a big frogmouth lacking a tail and labelled Dulit, which had drop-like white spots on the wing-coverts consistent with a Large Frogmouth—given its large size, it is possible that the specimen is actually a Large Frogmouth misidentified as a Dulit Frogmouth.

Specimens of Dulit and Large Frogmouth (Plates 6–9) were also examined by JAE at the Natural History Museum, Tring. In plates 6–8 the specimens shown, from top to bottom, are Dulit Frogmouth, Large Frogmouth from Sarawak and Large Frogmouth from Perak, Peninsula Malaysia. The following differences were noted between the two species:

- (1) overall size: Dulit was noticeably smaller, though this was difficult to see in the field
- (2) overall ground colour: Dulit noticeably darker particularly on crown, throat and breast, lacking bright tones of Large
- (3) Dulit showed distinct barring on lower throat; barring less distinct, sometimes absent on Large

**Plate 5.** The Dulit Frogmouth family, 9 April 2014.



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**Plates 6–8.** Specimens of Dulit Frogmouth, Large Frogmouth from Sarawak and Large Frogmouth from Perak, Peninsular Malaysia, examined by JAE at the Natural History Museum, Tring, August 2014.



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**Plate 9.** Undersides of primaries: extensively barred on Large (top), less so on Dulit (bottom).

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- (4) barring on belly more distinct on Dulit than Large
- (5) rear crown: pale barring distinct on Dulit, less so on Large
- (6) underwing on primaries: extensively barred on Large, less so on Dulit (Plate 9).

Differences between male and female plumage of the large *Batrachostomus* frogmouths are also poorly documented, with the lack of diagnostic plumage differences between adult birds highlighted in a recent article on nesting Large Frogmouths (Tan & Yong 2010). Not surprisingly, the same is true for the Dulit Frogmouth, with only a few authors attempting to describe differences between the sexes. MacKinnon & Phillipps (1993) described female Dulit Frogmouth as having a chestnut-brown colouration, as opposed to the purplish-brown of the male, whilst also sporting a whiter nape collar. Cleere & Nurney (1998) described the female as being slightly smaller and darker than the male, with the underparts more heavily speckled and vermiculated brown, lacking marking on the tips of primaries 2–4 and perhaps having longer wings and tail.

**Plate 10.** The pair of Dulit Frogmouths showing noticeable differences in plumage. The ‘diurnal bird’ (on the left) has a richer chestnut-brown colouration on the tail and hindneck collar, distinctly thicker tail-bands, and a thicker, more prominent white collar, as well as more prominent, tightly packed black spots on its scapulars than its partner on the right, Sarawak, 5 April 2014.



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Analysis of images of both adult birds at the nest site highlighted a degree of sexual dimorphism (Plate 10). The ‘diurnal bird’, so named because of its consistent presence during daytime observations, was the more striking and well-marked of the pair. Overall, it had a richer chestnut-brown upperpart colour, particularly on the upperwing-coverts, tail and hindneck collar. In contrast, the other bird was plainer and duller overall, with a significantly smaller chestnut-brown area on the wing-coverts and a purplish-brown hindneck collar. The diurnal bird also had large, densely packed white spots edged with black on the upperwing-coverts, while those of the other adult were noticeably smaller and appeared to be confined primarily to the tips of the wing-coverts. The diurnal bird also showed more prominent, tightly packed black spots on the scapulars compared with its partner. Finally, the diurnal bird had distinctly broader tail-bands and a thicker, more prominent white collar. Given the descriptions of female Dulit Frogmouths above, and the fact that most female *Batrachostomus* frogmouths are brighter than their male counterparts (Cleere & Nurney 1998), it is likely that the diurnal bird was the female.

### Vocalisations

The song of the Dulit Frogmouth was first described in 2010 as a loud, trumpeting *whooooooah* repeated 1–8 times with an interval of between 1.0–2.7 seconds (Yong & King 2010). Our recordings corroborate this observation, with singing birds noted to repeat a level, low-pitched call with relatively even spacing (Figure 1).

Two different individuals were also heard to utter previously undescribed contact calls in response to playback. One such call can be described as a low-pitched, barking *who-WOOP*, with the second note distinctly louder and sharper than the first (Figure 2). Series of calls comprising five and eight notes respectively, with an interval of 0.33–0.48 seconds between notes, were recorded. The second call, uttered by a different individual, can be described as a three-note *WHOOP-woop-whoop*, the first note being the sharpest and with a noticeable delay between the second and third. The interval between each series of calls was 6.2–9.1 seconds, noticeably longer than the first variant (Figure 3).

### Discussion

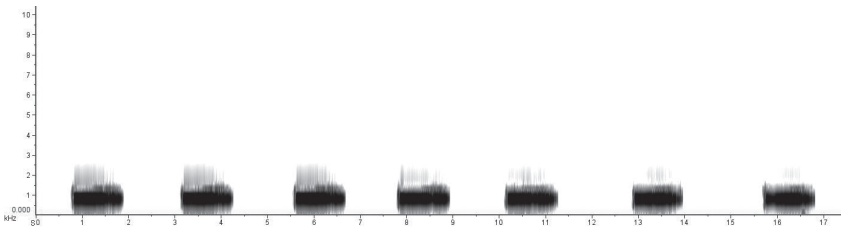
The lack of information on the ecology of the Dulit Frogmouth has hampered research and the establishment of appropriate conservation measures (BirdLife International 2014). Our observations allow several deductions to be made about the ecology of the species.

Given the discovery of the nest on 4 March, the first observation of a downy chick on 19 March and its subsequent fledging by 22 April, we infer an incubation period of 17 days or more and an approximate fledging period of 35 days. This is similar to recent documentation of the breeding cycle of the Large Frogmouth, which estimated a 20–38 day fledging cycle from the time the chick was first observed (Tan & Yong 2010). In addition, the sharing of brooding duties reported in nesting Large Frogmouths (Tan & Yong 2010) may apply to this species as well: note the consistent presence of the strongly marked individual during diurnal observations and its subsequent disappearance after nightfall on several occasions. Brief bursts of calling noted after nightfall and after first light may have been linked to change-overs at the nest.

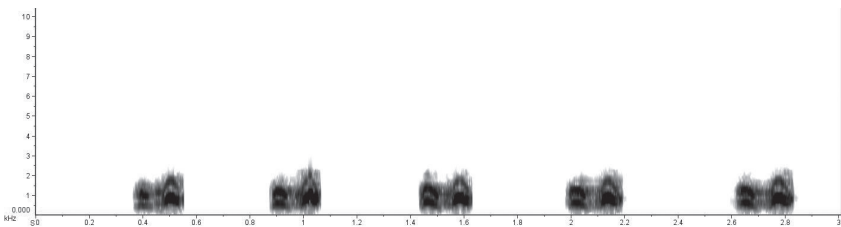
The observation of six individual Dulit Frogmouths, including the breeding pair, in a tract of disturbed hill forest with numerous clearings is particularly noteworthy. From an ecological perspective, it suggests a tolerance of—or even preference for—forest edges or stunted kerangas forests. This is similar to the habitat preferences of the Large Frogmouth of the lowlands, which occurs in particularly high density in the lowland secondary growth of Way Kambas National Park, Sumatra (LBW pers. obs.). However, nesting birds might still prefer to nest near a water source, not unlike Large

Frogmouths in Peninsular Malaysia, where all recent documented nesting records have been close to forested rivers (Wright 2009, Tan & Yong 2010). From a conservation perspective, the Dulit Frogmouth's tolerance of disturbed environments bodes well for it in view of continuing forest clearance in Borneo (BirdLife International 2014). Further research into its ecology should involve targeted expeditions to selectively logged forest in the highlands of Borneo and engagement with local village communities, who often mistakenly refer to the birds as owls owing to their large size and unusual vocalisations. Judging from our observations around Ba'kelalan, the species may be more numerous than present records suggest, with nocturnal surveys by RH and SS in April and July 2014 locating four territories along a 1.7 km stretch of road through disturbed secondary forest. Anecdotal reports of roosting individuals in highland village gardens are also worthy of further investigation.

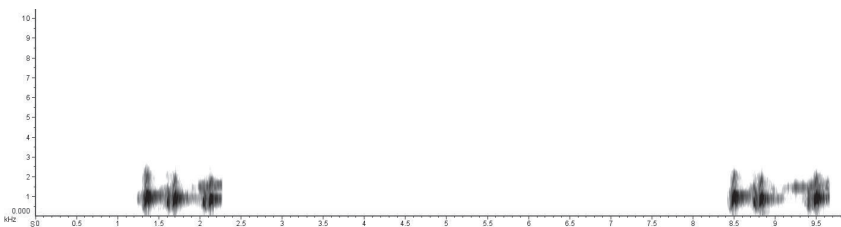
We hope that the information presented here will facilitate further observation and documentation of one of Borneo's least known and beautiful avian endemics. With increasing encroachment by logging companies into the Bornean highlands, there is increasing urgency to identify and protect suitable habitat in these areas to safeguard not only the Dulit Frogmouth but also the other localised and threatened Bornean endemics.



**Figure 1.** Sonogram of a Dulit Frogmouth's song from Sarawak showing a level, low-pitched call at 0.5–2.0 kHz.



**Figure 2.** Sonogram of variant 1 of a Dulit Frogmouth's contact call from Sarawak, at 0.5–2.0 kHz.



**Figure 3.** Sonogram of variant 2 of Dulit Frogmouth's contact call from Sarawak. The bird called twice over a 10-second period with a frequency of 0.5–2.5 kHz.

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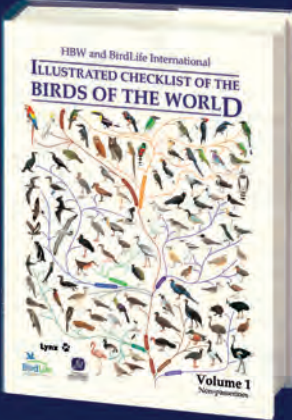
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