FIELD STUDY

Observations on the nesting of the Large Frogmouth *Batrachostomus auritus* in Taman Negara National Park, peninsular Malaysia

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Introduction

The aptly named Large Frogmouth *Batrachostomus auritus* is the largest Asian frogmouth and possibly the least frequently recorded of the three species occurring in the Malay peninsula. It is currently listed as globally Near Threatened (BirdLife 2010) given its dependence on lowland dipterocarp forest, a rapidly disappearing habitat in Sundaic South-East Asia (Lambert & Collar 2002). Wells (1999) described it as a specialist of plains-level forest and all recent records have indeed originated from the lowlands, particularly the Taman Negara National Park in peninsular Malaysia, most of which lies at elevations below 305 m (Yeap *et al*. 2007). Elsewhere in its range there are few recent records except from Way Kambas National Park in southern Sumatra where it is still regularly recorded (Olay & Simay 2007) and, occasionally, from Danum Valley and Gn Mulu National Park, both in northern Borneo (Holyoak 1999, Smythies 1999). In peninsular Malaysia, it is regularly seen in parts of the Krau Game Reserve (F. R. Lambert *in litt*.) and was formerly recorded in the well-studied Pasoh Forest Reserve, Negri Sembilan (Wells 1999), but there are no recent records.

There are three known recent nest records, one from Taman Negara in 2006 (Wright 2009) and two from Way Kambas in July 2007 (J. Olah *in litt*.) and July 2008 (J. Eaton *in litt*.). All three records referred to single unsexed adults at the nest, although Eaton noted the presence of a chick. However, various aspects of the nesting cycle, including incubation, fledging period and parental care, are still largely unknown (Holyoak 2001) and the chick of this species is hitherto undescribed (Cleere 2010). Here we report on observations made at a nest of a Large Frogmouth in Taman Negara and present the first photographic images and description of the chick of this little-known species. Our observations were made over a ten-week period from 14 February, when a nest was first suspected, to 26 April 2010.

Description of the nest

The nest was located in a rather poorly concealed position 4 m above the ground and about 30 m from a river in primary lowland dipterocarp forest at an elevation of about 120 m (Plate 1). The nest was an estimated 7–8 cm in diameter and was built in the fork of a horizontal branch (about 5 cm thick) and a thinner branch. It was a cup-shaped platform partly enveloping the horizontal branch as well as the base of the thinner branch on which it rested (Plate 2). In the early part of the observation period, there were small fresh green leaves as well as dried leaves on the nest, which together formed the bulk of the structure. There also appeared to be a fine layer of dark silk-like material around the exterior of the nest, and this is likely to have originated from the adult's feathers, which are known to be regularly used in the nests of a number of *Batrachostomus* species. As the nest was relatively small and compact, the adults had to perch next to it when feeding the chick.

Plate 1. Nesting environment of the Large Frogmouth *Batrachostomus auritus*, Taman Negara NP, Malaysia, April 2010.

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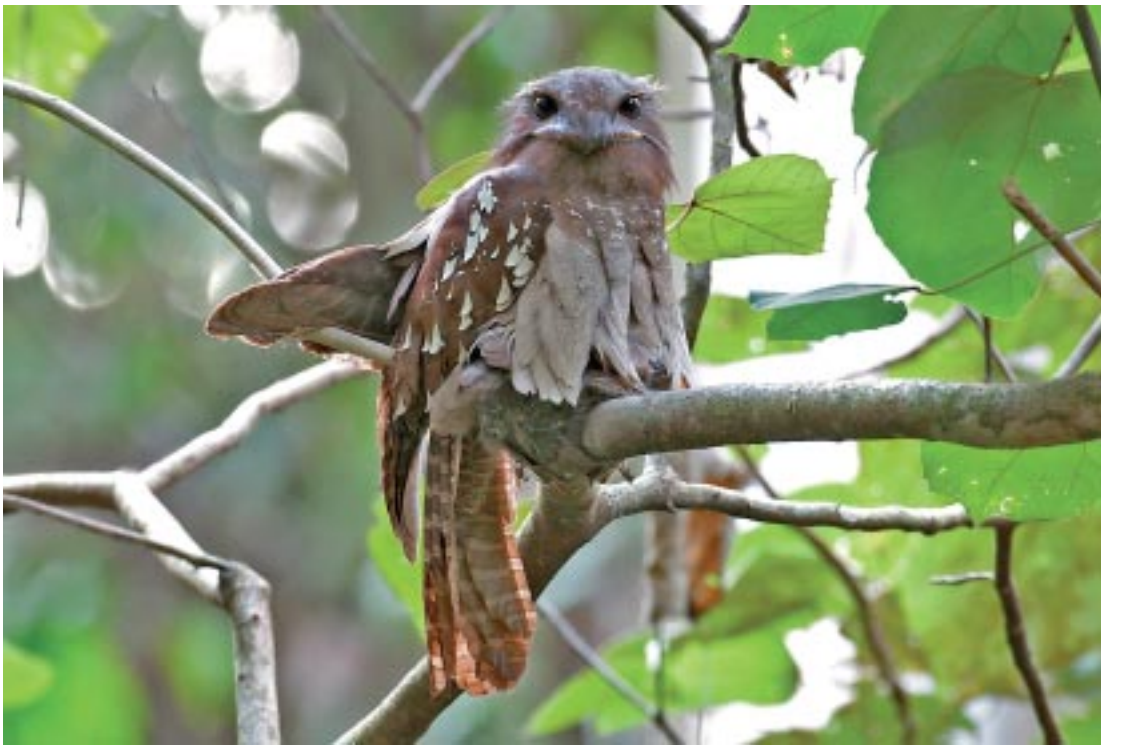

Plate 2. Large Frogmouth at nest, with one wing resting on a thin branch, Taman Negara NP, Malaysia, 20 March 2010.

Description of the chick

We first observed the chick when it was 2–3 days old (20 March). It appeared to be very similar to that of other *Batrachostomus* frogmouths, being entirely covered with fine white down (Plate 3), although at the time of observation we noted that flight feathers had started to develop on the wings. When the chick was about 15 days old (2–3 April), most of its white down had already been replaced, remaining only on parts of the head and throat, whilst both upperparts and underparts were covered in brown feathers. The flight feathers were completely developed and starting to show patterning typical of the adults.

Plate 3. Large Frogmouth chick at 2–3 days old, Taman Negara NP, Malaysia, 20 March 2010.

Plumage differences between the adult frogmouths

Although we were unable to sex the adults definitively, there were noticeable differences in plumage, suggesting limited sexual dimorphism (Plate 4). Comparison of photographs taken on each visit revealed that it was always the same individual present at the nest during daylight hours (the 'day-shift' parent). This bird was the more strongly marked of the adult birds and had white spots edged with little or no black on the upperwing-coverts, giving them a distinctly triangular appearance. The second adult (the 'night-shift' parent) had clearly smaller, more teardrop-like white spots, edged with much more black. On the scapulars, the 'day-shift' parent had black subterminal spots with buff tips whereas the 'night-shift' bird had larger and more prominent black spots. We also noted that the 'day-shift' adult possessed more well-defined pale buff brows and darker inner webs to the primaries, which appeared blackish rather than brownish. Given that

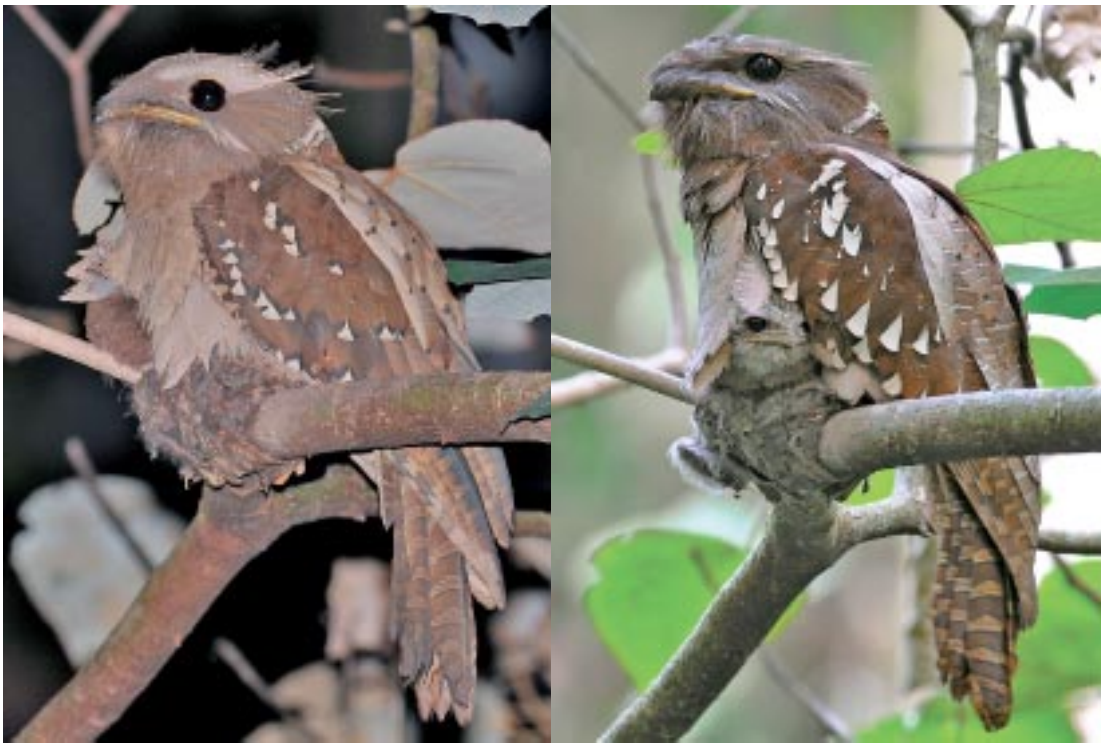

Plate 4. Large Frogmouth, comparison of 'day-shift' parent (left) and 'night-shift' parent (right), both with chick, Taman Negara NP, Malaysia, 2–3 April 2010. Note the subtle but clear plumage differences.

females may be plainer and duller (Cleere 2010), it is likely that the 'night-shift' bird was the female.

Chronological summary of observations

14 February

An adult Large Frogmouth was first observed at 18h30 by YDL, perched on a branch of an unidentified tree. The bird was observed until 19h00 and again from 23h00 to 23h45. It seemed to remain in the same spot and in an unchanged position over that time, leading us to believe that it was possibly nesting, although we were unable to make out any nest structure.

15 February

Observations were made sporadically from 11h00 to 15h00. The bird was in almost the same position as the previous evening. We noticed small bits of dried vegetation sticking out from the bird's breast feathers and closer examination showed that this was actually the lower part of the nest structure, much of which remained concealed under the bird. We inferred from its behaviour that the bird was actively incubating.

25 February

Observations were made from 08h30 to 14h30. An adult was present at the nest during the entire period,

Plate 5. Rear view of Large Frogmouth on nest, Taman Negara NP, Malaysia, 25 February 2010.

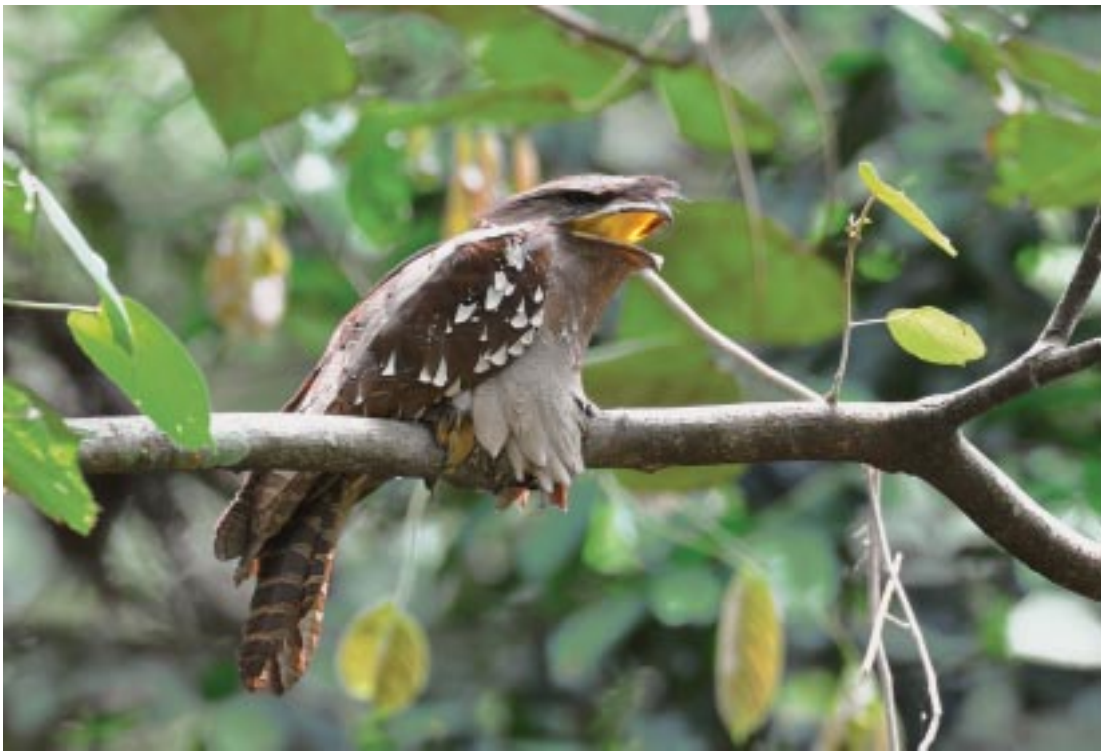

Plate 6. Large Frogmouth opening its mouth to cool down after 10 minutes of exposure to direct sunlight, Taman Negara NP, Malaysia, 25 February 2010.

perched lengthwise along the nest branch, with its tail towards the tree trunk (Plate 5). In this position it resembled a clump of dead leaves. When a wild pig *Sus scrofa* and a squirrel *Callosciurus* sp. passed close by, the frogmouth opened its eyes and slowly turned its head to look. When each animal approached within 10 m, the bird slowly tilted its head up, keeping its eyes marginally open to monitor potential disturbance. We did not observe any discernible compression of the bird's body to adopt the 'broken branch' or freezing posture, in contrast to the behaviour of other frogmouths, particularly the Australian Frogmouth *Podargus strigoides*, when alarmed (Holyoak 1999).

28 February

Observations were made briefly from 02h00 to 02h30, and from 15h00 to 15h45. A bird was still on the nest. During the later visit, a pair of vocal Black Magpies *Platysmurus leucopterus* came very near to the nest, alarming the incubating bird sufficiently to open its eyes completely, but it resumed its normal position once the visitors left.

20 March

Observations were made 18h00 to 20h15, sunset being around 19h15. We noted that a few belly feathers of the sitting 'day-shift' adult shuffled for a few seconds, although it was not clear if these movements originated from the adult or a concealed chick. We subsequently observed the 'night-shift' adult perched beside the nest, which was now exposed, revealing a single downy chick. The chick was estimated to be 2–3 days old and was covered in white downy feathers, similar to those of other frogmouth species (Jayarathna 2004) but it had also started to develop flight feathers on its wings.

The 'night-shift' adult brought back a relatively large, unidentified green insect, possibly a mantid, and fed it to the chick, which struggled to swallow it. Even before the chick had fully ingested the prey, the adult repositioned itself over the nest and covered the chick. After about 20 minutes, the adult looked around briefly before flying off. Subsequently, the 'day-shift' adult returned with a large brownish, unidentified arthropod. This was quickly fed to the chick and again the adult proceeded to position itself over the nest, covering the chick once more.

2–3 April

The nest was monitored with an infra-red sensitive video camera continuously from before sunset on 2 April to the morning of 3 April. On our arrival at the site at 18h00, the adult on the nest was identified as the 'day-shift' bird. The chick was now

approximately 15 days old and filling the nest. Most of its white down had been shed: only the throat and parts of its head remaining white. The underparts were covered with brown feathers and the flight feathers showed patterns typical of the adults, although the tail was notably short. It exercised its wings vigorously from time to time, even forcing the brooding adult to flap its wings to maintain balance. When looking at the observers, the chick would sometimes move its head side-to-side in the manner typical of owls.

Plate 7. Large Frogmouth 15-day-old chick with 'night shift' parent, Taman Negara NP, Malaysia, 3 April 2010.

Plate 8. Large Frogmouth, view of 15-day-old chick, Taman Negara NP, Malaysia, 2 April 2010.

At 19h30, while the chick was still flapping its wings, the adult flew off. Seven minutes later the same adult returned to the nest with food for the chick. After several minutes it flew off again and returned about 14 minutes later with a relatively large brown insect, which proved too large for the chick to eat. After several unsuccessful attempts, the adult ate the insect itself. At 20h31, the 'night-shift' adult flew in and perched next to its brooding partner. This was the first time both adults had been seen at the nest together, although the 'day-shift' adult flew away 10 seconds later. The 'night-shift' adult did not bring any food for the chick and appeared just to be taking over brooding duties. At 21h35, the 'day-shift' adult returned and both adults remained together for a while. Then the 'day-shift' bird took over the nest duties. Through the course of the night the chick was fed a total of six times, half of which occurred within the 70 minutes before dawn. One prey item was a stick insect, part of which was fed to the chick while the adult ate the remainder. This adult then repositioned itself back at the nest where it remained until observations ended at 08h35.

25 April

We arrived at the nest site at 19h50 and found the nest empty. After some searching, the 'night-shift' adult was located nearby, perched on a bare horizontal vine with its wings partially spread, apparently attempting to dry itself. The chick and 'day-shift' adult were not observed at all.

26 April

Observations were made over a rainy morning and afternoon. The nest site was visited at 09h00 but no birds were found. When revisited at 11h05, the family of three were perched snugly together on a drooping branch about 20 m from the nest. The chick was visibly smaller than its parents and was perched between them. From 12h50 to 14h30, all three birds remained largely in the same position with the chick still occasionally exercising its wings. We estimated it to be about 20 cm long—slightly more than half the length of the adults. Its underparts were the same chestnut brown as the adults but lacked the white spots, as did the upperwing-coverts, whilst its primary and tail feathers were barred like those of the adults.

Discussion

Little was previously known about the nesting cycle and parental care of the Large Frogmouth and,

Plate 9. Large Frogmouth, adults with 38-day-old chick, Taman Negara NP, Malaysia, 26 April 2010.

although we could not be present daily, our observations allowed us to make a number of inferences about the breeding biology of the species. The nest was discovered on 14 February and the chick first seen on 20 March, when it was already roughly 2–3 days old. It is assumed that only one egg was laid. If the egg was laid around 14 February and the chick hatched on 18 March, the incubation period was 32 days (more if the egg was laid earlier). By the time of our final visit on the 25 and 26 April, the chick had left the nest. This indicates that the chick took somewhere between 20 and 38 days to fledge.

The consistent, temporal partitioning of brooding duties is probably the first reported for the Large Frogmouth, although we were unable to sex the adult birds confidently despite noticeable plumage differences. While it is claimed that the male incubates during the day and the female at night, Holyoak (2001) suggested that this could just be speculation inferred from the behaviour of closely related species and is thus not entirely certain. Of the few specimens that have been sexed, most appear to be males and information on the female plumage is still lacking. There are no diagnostic differences in plumage which allow observers to identify the sex of birds confidently.

During our observations, we noted that the brooding adult would sometimes wait for its partner to fly in and perch beside the nest before leaving it. At other times, it would start to look around for reasons unclear to us before flying off. Shortly after, the second adult would fly in to assume nest duties. We were unable to tell if sight, soft vocalisations or any other means were used to detect the approach of the other adult. Indeed, we did not notice any vocalisations during the entire period of observation. We used a tape playback at the end of the period but this did not elicit any response from the birds although they were clearly present nearby.

The nest structure we have described seems to be very similar to those of the nesting birds on Sumatra in 2007 and 2008 (see OBI at http://www.orientalbirdimages.org). It appeared to be made largely from plant matter, especially dried leaves, with smaller amounts of down. This contradicts Robinson & Chasen (1936), who described a nest from Sarawak as being a small circular pad of closely matted down, and a description in Robson (2002). On the other hand, our description of the nest together with the Sumatran records sets it apart from the descriptions of nests of a number of other smaller *Batrachostomus* frogmouths, which are mostly composed of down (Holyoak 1999, Wells 1999, Jayarathna 2004).

There are two previous nesting records in peninsular Malaysia from Kota Tinggi, Johore (Wells 1999) and Taman Negara (Wright 2009); our record here represents the third and most complete documentation of nesting for this species in the Malay peninsula and possibly its entire range, presenting previously unknown details of parental care and general nesting phenology.

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References

BirdLife International (2010) Species factsheet: *Batrachostomus auritus*. Downloaded from http://www.birdlife.org on 19/10/10

Cleere, N. (2010) *Nightjars, potoos, frogmouths, oilbirds and owlet-nightjars of the world*. Maidenhead, U.K.: Wild Guides.

Holyoak, D. T. (1999) Family Podargidae (frogmouths). Pp.266–287 in J. del Hoyo, A. Elliott & J. Sargatal, eds. *Handbook of the birds of the world*, 4. Barcelona, Spain: Lynx Edicions.

Holyoak, D. T. (2001) *Nightjars and their allies*. Oxford: Oxford University Press.

Jayarathna, K. D. T. (2004) Observations on a nest of Sri Lanka frogmouth *Batrachostomus monileger*. *Forktail* 20: 129–130.

Lambert, F. R. & Collar, N. J. (2002) The future for Sundaic lowland forest birds: long-term effects of commercial logging and fragmentation. *Forktail* 18: 127–146.

Olah, J. & Simay, A. (2007) Way Kambas National Park, Sumatra, Indonesia: the best Asian night-birding. *BirdingASIA* 8: 39–44.

Robson, C. (2002) *A field guide to the birds of South-East Asia*. London: New Holland.

Robinson, H. C. & Chasen, F. N. (1936) *The birds of the Malay peninsula*, 3. London: Witherby.

Smythies, B. E. & Davison, G. W. H. (1999) *The birds of Borneo*. Fourth edition. Malaysia: Natural History Publications (Borneo).

Wells, D. R. (1999) *The birds of the Thai-Malay peninsula, non-passerines*. London: Academic Press.

Wright, J. (2009) Observations of a nesting large frogmouth in Taman Negara, Peninsular Malaysia. *BirdingASIA* 11: 105.

Yeap, C. A., Sebastian, A. C. & Davison, G. W. H. (compilers) (2007). *Directory of Important Bird Areas in Malaysia: key sites for conservation*. Kuala Lumpur, Malaysia: Malaysian Nature Society.

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